

THE REHABILITATION OF A BILATERAL AMPUTEE A CASE REPORT

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SYNOPSIS

The rehabilitation of a bilateral lower limb amputee with extensive arteriosclerosis and coronary insufficiency is described. He was fitted with definitive prostheses and also prescribed a wheelchair. On discharge, he was able to return to work, as well as adjust to social and domestic life. Adaptations and modifications to his home and office are described. Factors that are taken into consideration when planning such a programme are discussed.

INTRODUCTION

Rehabilitation is a continuous process which should begin before the decision to amputate is made and should be maintained until the expected level of function has been attained. (1) In patients with generalised arteriosclerosis, it must be remembered that cerebral and cardiac circulation is likely to be impaired as well, making prosthetic walking difficult, as a much higher energy output is required.

This paper describes the total rehabilitation of a 47 year old patient who had extensive arteriosclerosis and coronary insufficiency. He had a left below knee amputation and a right above knee amputation. Only partial ambulation was possible, and adaptations and structural modifications were carried out both at his home and office, ensuring maximal independence.

Several factors must be considered before a rehabilitation programme such as this, is planned. This includes not only the patient's physical condition, but also his mental, social and psychological status, and his motivation.

CASE REPORT

A 47 year old Indian male was admitted for rehabilitation on the twenty-first of June 1976. He had a right above knee amputation and a left below knee amputation. He had a past history of having had painful ulcers on his toes for about 7 years. A Bilateral Sympathectomy was done in 1972 with unsatisfactory results. In January 1976 he had amputations of his left second to fifth toes, and in April 1976 he was admitted for complaints of palpitations and breathlessness at rest.

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An aortogram was done and the following results noted. There was a complete obstruction at the point of origin of the left Subclavian artery from the aortic arch. From the level of the Renal artery downwards, there were multiple arteriosclerotic lesions throughout the Aorta. Definite arteriosclerotic changes were present in the proximal branches of the left Renal Artery. Extensive collaterals had formed from the first Lumbar arteries to the branches of the Internal Iliac Artery. The Inferior Mesenteric Artery was also hypertrophied and functioned as a collateral.

The Aorta was most narrowed at the bifurcation, and the proximal segments of both the Common Iliac Arteries were narrowed almost to the point of being completely obliterated. The narrowing on the right side involved a longer segment than the left. The superficial Femoral Arteries on both sides were completely obliterated, and the blood supply to both thighs was entirely by way of the Profunda Femoris Arteries. There were well developed collaterals on each side. Both Popliteal Arteries were extremely small, and the right Anterior Tibial Artery was obliterated while the right Posterior Tibial Artery was small and tapered off. Blood supply below the mid-shaft of the right Tibia was entirely by small corkscrew like vessels. None of the main arteries could be identified. On the left side, the Anterior Tibial Artery was patent, and extensive collaterals were present from the Posterior Tibial. Just above the ankle, all arteries were obliterated and the small corkscrew vessels only were present.

A diagnosis of Arteriosclerosis and Occlusion of the Bifurcation of the Abdominal Aorta was made, and on the 12th of May, he had the following operations: (1) Thromboendarterectomy and Patch Graft to the bifurcation of the Abdominal Aorta. (2) By-pass graft from the Common Femoral Artery to the Popliteal Artery on both sides.

These, however did not restore adequate circulation, and on the 22nd of May 1976 a right above knee amputation was carried out. This was followed by a left below knee amputation, on the 28th May 1976.

MANAGEMENT

The aim of rehabilitation was to achieve maximal independence in mobility and self-care activities, and to overcome social and vocational problems. This involved the full cooperation of all members of the rehabilitation team, including doctors, physiotherapists, occupational therapists, the medical social worker and the prosthetists, as well as the well motivated patient.

Mobility

Taking into account the patient's disability and cardiovascular status, it was decided that mobility was to be achieved by prosthetic walking as well as wheelchair use. Physiotherapy consisted of strengthening of both upper limbs and trunk muscles. This was achieved with weights and springs, with special attention being paid to the building up of strength and endurance of the Latissimus Dorsi. Stump exercises were also taught, to strengthen all remaining musculature, in particular those opposing the muscles which are prone to hyperactivity and contractures in relation to the level of the amputation. Correct stump bandaging was taught.

The patient was fitted with definitive prostheses. Exercises in standing balance and weight transfers were done in parallel bars, until a satisfactory balance was achieved. Ambulation was initially taught within parallel bars. Right from the start, a four-point gait was used. Progression in ambulation training consisted of the use of a reciprocal frame, two quadruped sticks and finally two canes.

The patient was highly motivated at all times and participated fully in his rehabilitation programme. Maximal independence was achieved in all aspects of mobility including the management of stairs, slopes and uneven ground in a relatively short period of time.

An amputee wheelchair was prescribed for the patient. This chair is specially designed for users with single or double lower limb amputations. Rear wheels are set back one and seven-eighth inch to compensate for the shift of the centre of gravity due to limb loss, and to maintain chair balance. The swinging detachable footrests can be easily removed when the prostheses are not in use, and the chair is easily manoeuvred. The occupational therapist assessed and prescribed the chair, and the patient was taught to propel himself on level ground and on slopes. The armrests could be safely detached for easier reach to the outer rim, for propulsion up and down slopes.

Self-care Activities and the Home

The patient was taught to be independent in dressing. He was independent in transfers, eg. from chair to bed and to the toilet seat etc. A squatting toilet was in use at home, and to overcome this problem, a collapsible toilet seat was installed, ensuring the patient's total independence in attending to his toilet needs. After a home visit, modifications to the house were recommended. Cement ramps were made from the kerb to the house, and within his home, wooden ramps were installed from the sitting room cum dining room to the kitchen, and from the kitchen to the courtyard, where the bathroom and the toilet were situated. Thus accessibility was ensured within his home, and full independence was possible.

Vocational

The patient was an accountant in a factory in Jurong, and was determined to go back to his old job. Prior to discharge, a visit was carried out to the factory, by the doctor, physiotherapist, occupational therapist and medical social worker. This was done to ascertain if full independence was possible in his work environment. Architectural barriers present were checked, and the patient and the employer were given advice on how best to overcome them.

The upstairs office was approached by a flight of steep stairs. Although the patient could manage the stairs, a great deal of effort was involved. There was however a cement ramp leading from the road to a service lift. The patient was advised to use this entrance, and he was able to get out of the car and propel himself up the ramp and into the lift. Although corridors and doorways were narrow, there was adequate space to manoeuvre the wheelchair. The toilet area was partly accessible, and once within the main door, he had to walk, using his two walking sticks, to the toilet cubicle.

Initially, a friend gave him a lift to work, and the patient transported his wheelchair from home to work and vice versa. Later on he found it more practical to buy a second wheelchair for use in the office. This was a standard wheelchair which he used at work with his prostheses on. The amputee chair was used at home when he took his prostheses off. Thus full independence was achieved both at home, and at his office in the factory.

DISCUSSION

The total management of a bilateral lower limb amputee involves the coordinated efforts of each member of the rehabilitation team. The programme must be tailored to meet each individual's needs, taking into consideration, the

physical, mental, psychological and social aspects of each case.

The leading article of the British Medical Journal, 12th September 1981, calls for careful assessments before artificial limbs are supplied. (3) The cost of providing artificial limbs is phenomenally high, taking into consideration alteration, modification, labour and transport costs, not forgetting the cost to the patient in terms of exhaustion, frustration and disappointment. Thus it is imperative that a full assessment of each patient is carried out, bearing in mind the factors discussed below.

Age and physical fitness will influence prosthetic use. Degenerative disease or dysfunction of any system of the aging body may complicate the attainment of functional competence. (2) Exercise tolerance, fatigue level and upper limb strength and function must be assessed. Frail, elderly patients may best be rehabilitated in a wheelchair, and taught wheelchair mobility and self-care activities, returning them quickly to their families and homes, rather than spend their remaining years in a vain bid at ambulation.

Associated medical conditions limit the goals a bilateral lower limb amputee is likely to achieve. Middleton (4) in a retrospective study, showed that all amputee patients are likely to present multiple and complicated clinical problems, with associated diseases such as Diabetes Mellitus, Ischaemic Heart disease, cardio-vascular disease Arthropathy, Visual impairment and significant depressive illness. Kerstein (5) reported that cardiopulmonary problems were the most common limiting factor in the rehabilitation of a bilateral lower limb amputee. With increasing age, cardiopulmonary problems, including cardiovascular disease were the most significant factors. Diabetes Mellitus and local stump problems delayed rehabilitation, but high goals were attained.

In prosthetic rehabilitation, a significantly higher energy output is required. It is estimated that with a single below knee amputation, it takes 20% more energy in ambulation, than it does with two legs. Walking with an above knee amputation requires 40% increased energy output. (2) Thus, when cardiopulmonary function is compromised, ambulation is best limited to short distances. Hamilton (2) also believes that the provision of a wheelchair is essential to all bilateral lower limb amputees. And, if hemiplegia, arthritis or dyspnoea makes propulsion difficult, a powered wheelchair should be prescribed.

A bilateral amputee is faced with a whole new way of life. To adapt effectively, not only must he cope with the problems of prosthetic use, but also relearn life's day to day activities. A new gait pattern has to be learned, with the correct use of the prostheses during the phases of the walking cycle. (6) The asymmetrical rhythm of training at two different levels may result in failure of rehabilitation. (7) New methods of dressing, toileting and wheelchair use must be learnt. The patient's cerebration and mental faculties must therefore be carefully assessed, when planning the rehabilitation programme. He must be able to understand, follow and remember instruction, and he must be able to cooperate with the team in achieving the predicted goal.

The success of a rehabilitation programme can depend to a large extent on the initial handling of the patient's psychological problems. The grief reaction must be understood, and support and counselling given at the right time. Feelings of fear, guilt, denial, anxiety about the future and financial security and strong feelings of personal and sexual inadequacy, are often present. Taylor (8) suggests that significant people in the patient's life, such as family and

close friends, be called in to participate in the programme, giving the patient support and understanding through the stages of the grief reaction. Working together in a group with other amputees can be of great help. The patient must be able to cope with the immediate psychological trauma before he can cope with a new way of life.

To achieve total independence within the home, a home visit must be carried out prior to discharge. Assessing the patient's home is the prime responsibility of the hospital team. (3) The assessment must take into account, the need for structural alteration, rehousing, the supply of equipment and the family's acceptance of the patient. The patient's ability to manage a wheelchair or prostheses in the home environment must also be checked. A patient may be able to cope in the hospital, but not at home, if there are steps, narrow doors, no ramps, and no handrails in the toilets. Van de Ven (9) in a survey of 80 bilateral amputees, found that a very large number had accommodation problems, such as steps within and outside the house, and were unable to use the toilet and bath. Many of the problems appeared to exist because home visits were made after discharge. In many cases, no home visits had been made, and structural alterations and rehousing were thought of too late. Suitable accommodation and social support play an important part in the success or failure of rehabilitation and the final degree of independence achieved. (9, 10, 11).

When a patient is in the employable age group, a visit to the factory or office should be carried out when necessary. Accessibility must be looked into, and recommendations for simple alterations made. Many employers will be willing to make minor alterations and accept the patient into his former job. Hunter (10) in a review of 53 bilateral lower limb amputees reports that occupational status remained unchanged in 20% of those with one above knee and one below knee amputation. The return to work depends greatly on the patient's motivation and determination in overcoming all obstacles.

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REFERENCES

1. Vitali M, Robinson KP, Andrews BG, Harris EE: Amputations and Prostheses. Bailliere Tindall. 1978. Pg. 14.
2. Hamilton A. Rehabilitation of the older amputee. In: Nichols PJR, Rehabilitation Medicine. The Management of Physical Disabilities. 2nd Edition. Butterworths. 1980. Pg 210-22.
3. Editorial. Management of patients with bilateral amputations. Br Med J 1981; 283: 684-5.
4. Middleton FRI, Stephen PJ: Management of patients with bilateral amputations. Br Med J 1981; 283: 1184-5.
5. Kerstein MD, Zimmer H, Dugdale FE, Lerner E: Associated diagnoses which complicate rehabilitation of the patient with bilateral lower extremity amputations. Surg Gynaecol Obstet 1975; 140: 875-6.
6. May DRW, Davis B: Gait and the lower limb amputee. Physiotherapy 1974; 60: 166-71.
7. Vitali M, Harris EE: Prosthetic management of the elderly lower limb amputee. Clin Orthop 1964; 37:61.
8. Taylor BB: Rehabilitation of the elderly amputee. The New Zealand Journal of Physiotherapy. 1978; 6: 7-17.
9. Van de Ven CMC: An investigation into the management of bilateral leg amputees. Br Med J 1981; 283: 707-10.
10. Weaver PC, Marshal SA: A functional and social review of lower limb amputees. Br J Surg 1973; 60:732.
11. Hunter GA, Holliday P: Review of function in bilateral lower limb amputees. Canadian Journal of Surgery 1978; 21:176-8.