ENDOSKELETAL PROSTHESIS : A NEW ERA FOR AMPUTEE

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MJAFI 2001; 57 : 93-94

KEY WORDS: Amputation; Amputee; Endoskeletal prosthesis; Exoskeletal prosthesis.

Amputation is one of the oldest problems of mankind. In 1957 Smithsonian scientists found a skeleton of a caveman in Iraq and testified that the caveman had above elbow amputation, 45,000 years ago. So, we can say that the problem of amputation is as old as mankind itself. From very early, man tried to make for himself some substitute for the limb he had lost in battle or by accident. Documentary evidences and pictures are available which suggest that wooden prosthesis were used as early as 300 years before Christ. Many of these prostheses, although crude, illustrate the endeavour of man to overcome the handicap of an amputation [1].

Loss of limb not only causes physical handicap but also leads to social, psychological and economic effects, on the individual, his family, society and the country as a whole. This loss can be overcome to a greater extent by provision of a suitable artificial limb (prosthesis), which restores the function as well as total body image [2]. Till, recently, exoskeletal prostheses were the mainstay of rehabilitation for the amputees. The exoskeletal prosthesis, which is also called conventional or crustacean type of prosthesis, is commonly constructed with wood or plastic. The prosthesis walls not only provide shape but also perform weight bearing function. During fabrication of wooden prosthesis the walls of wooden components are reduced from inside. The exterior provides the final shape of prosthesis. The components are initially aligned in an alignment apparatus and then temporarily connected to each other, for trial. Any modification if required can be made during trial fitting. But once final finish has been done, only minor static changes can be made. The ensuing lamination provides additional strength to the prosthesis while also creating an attractive surface [3].

Exoskeletal prosthesis has some disadvantages :- [3-6].

a. Heavy and cumbersome

- b. Alignment can not be changed after final finish.
- c. Does not provide efficient stance phase and swing phase control
- d. Exoskeletal prostheses are not suitable for through knee amputation
- e. Fabrication time for exoskeletal prosthesis is much longer.

Endoskeletal prostheses that are being fitted now, have many advantages over exoskeletal prostheses. Therefore it has much better acceptability and higher level of clientele satisfaction. To name a few advantages :-[3-7]

- a. Increased wearing comfort :- these prostheses are not only light in weight, their range of movements is also much more. It is very easy for a patient to don and doff the prosthesis. There is no requirement to tie heavy, cumbersome waist belt or thigh corsets.
- b. Offers improved function :- it provides stance phase stability and swing phase control.
- c. Cosmetic :- cosmetically it has much better acceptability and restores appearance to near normal.
- d. The joints and adaptors of prostheses are modular and may be exchanged, making adjustment possible at any point of time.
- e. Endoskeletal prostheses are suitable for all levels of amputation
- f. The prosthesis has adequate provision for adjustment to achieve good dynamic alignment.
- g. Time required for fitment of endoskeletal prosthesis is much less as compared to exoskeletal prosthesis. Endoskeletal prosthesis provides the possibility of supply of a finished definitive prosthesis to the patient within days or in special circumstances even hours, after first attendance at the clinic.

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To conclude, endoskeletal prostheses are not only better cosmetically and superior functionally, they can be provided to amputees as per their need. They can provide stance phase stability to feeble geriatric amputee, while other functionally superior prostheses may provide chance to a young amputee to participate in games and sports.

Myo-electric upper limb prostheses are the most recent advances in field of artificial limb. It has got sensors located in the socket at a place, which correspond with the maximum electrical potential activity at myoneural junction (nerve-end-plate). These signals are picked up by the sensor which activate an electrical motor fitted in the hand or wrist unit, thus obtaining desired movements of the fingers. The electrical intensity is proportional to the conscious effort of the amputee to move the otherwise non-functional muscles at the stump [8].

In lead article by Gupta et al [9] in this issue titled : Patient satisfaction in prosthetic rehabilitation programme, author has taken in account not only quality of prosthesis but also various other parameters, including hospital services i.e. dietary services, vocational training, linen services, recreational facilities, while assessing patient satisfaction. In above mentioned study, patient satisfaction level was found lower among those patients, who received prosthesis late. This component of dissatisfaction can be corrected to a great extent by provision of endoskeletal prosthesis, which takes less time for fitment, as compared to

exoskeletal prosthesis. But authors conclusion that patient satisfaction level is not influenced by the feeling of prosthetic comfort, can not be agreed to. It is a well known fact which has been substantiated by many studies that more comfortable the prosthesis, better the acceptability. With cosmetics and improved functions added to this, endoskeletal prosthesis scores over exoskeletal prosthesis, and higher level of patient satisfaction can be achieved.

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