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Introductory Chapter: Technology and Orthotics and Prosthetics

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1. Introduction

In recent years, the use of technology has seen significant growth in the design and manufacture of advanced and intelligent orthoses and prostheses. Progress has been made in 4 areas in orthosis and prosthetics.

- 1) Material
- 2) Fabrication approach
- 3) Intelligent joints for orthoses
- 4) Intelligent joint in prostheses.

This has been accompanied by increasing growth in the materials used to make orthoses and prostheses. Activities of subject, the weight of the user are two important issues in used materials in fabrication of orthoses and prostheses for each subject. Flexible polymers, Carbon fiber, Kevlar and titanium are materials that were used to provide comfort and the strength and durability of the fabricated devices [1].

Computer-aided design/computer-aided manufacturing (CAD/CAM) technology is new manner to design and fabricate each type of orthoses and prostheses [2]. Scanning done by laser or hand held wand to provide measurement of limb. Based on this information the size and shape of limbs is given to prosthetist-orthotist to design and fabricate the mentioned orthoses and prostheses for the subject by computer [3].

Subjects with poliomyelitis, incomplete spinal cord injury and quadriceps weakness who have not knee stabilization during walking used devices with locked knee joints [4]. Walking with this condition provided high energy consumption and fatigue. Stance control knee joints are new generation of orthoses that developed in recent years in the world by many different companies [5]. Some of this type of joints is intelligent and smart that provided stability in stance phase and free swing during walking [6].

Intelligent prostheses can now be fabricated for the subjects with amputation [7]. This type of prosthesis in the lower limb permits the knee joint to sense alternation in position, speed and force, enabling subjects with amputations to walk down stairs and hills with confidence [8]. There were many developments in the prosthetic feet for running and other sport conditions. In the upper limbs prostheses, electrically powered units were used. This type of prosthesis can detect myoelectric signals provided by muscles to control the prosthesis [9].

Development in provided different orthoses and prostheses with advanced technology cause the prosthetist/orthotist is well trained and educated to construct devices based on the subject needs of each patient and to develop appropriate suggestions.

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