Concept of lower limb prosthetics and their recent technological evolution

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Keywords: Lower limb prosthetics; Lower limb amputation

Aim. – To describe the basic concepts of lower limb prosthetics (socket, joints and feet) and their recent technological evolution. Prosthetics for major trans-pelvic amputation are out of the scope of this review.

Methods/ Application. – An overview of the technical characteristics of all available components is proposed. We then consider the different medical-technico-responses. Based on the example of energy-storing feet, we describe the evolution of the reimbursement regulations which rely on independent technological assessment (by the CERAH), and on functional analysis of the patients situations which determine the medical indications and prescriptions.

Conclusion. – The choice of prosthetic knee must be the subject of a medical and paramedical consensus during a medical and technical multidisciplinary consultation, in order to use the technology available to satisfy the patient’s needs as best as we can.

Our proposal is to set up a decision pathway in order to use the technology according to the international classification of functioning and disability (ICF).

Bivariate and multivariate analysis to determine, within each dimension of the ICF, the factors that are related to high LPL. High LPL was defined by permanent prosthetic use for mobility outside, with no limitation of walking distance and without any walking-assisting device.

Results. – The functional performance levels (LPL) of trans-tibial amputees equipped with energy-storing foot.

Methods. – “Prosthetic Profile of the Amputee” questionnaire (Gauthier-Gagnon, 1994) was sent to all subjects aged between 30 and 65 years with unilateral trans-tibial amputation and fitted with an energy-storing foot, living in Nord-Pas de Calais and Picardie. Descriptive analysis of functioning and contextual factors according to the international classification of functioning and disability (ICF). Bivariate and multivariate analysis to determine, within each dimension of the ICF, the factors that are related to high LPL. High LPL was defined by permanent prosthetic use for mobility outside, with no limitation of walking distance and without any walking-assisting device.

Discussion. – In order to maintain a high NPL, there is a need to prevent cardiovascular impairments and to enhance balance capacity. Readaptive follow-up is necessary to readjust physical and human environment to the deterioration of locomotor performance.

What are the criteria for choosing a prosthetic knee for the trans-femoral amputee? Proposals for a decision pathway

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Keywords: Prosthetic knee; Decision pathway

For the trans-femoral amputee, the two main requirements in the choice of prosthetic knee are safety and mobility (two requirements sometimes opposing). These two requisites will be subject to the characteristics of the knee itself and the entire prosthetic process. The functional goals of the patient’s needs may be assessed on the basis of the person’s activity profile (LL-0 to LL-4) according to the INTERBOR nomenclature based on the AOPA classification (American Orthotic and Prosthetic Association) and the ICF (International Classification of Functioning). The technical possibilities of prosthetic knees are diverse and varied: locking knee, open monopod or polycentric knee, knee with hydraulic and/or pneumatic assistance, microprocessor-assisted knee.

Our proposal is to set up a decision pathway in order to use the technology available to satisfy the patient’s needs as best as we can.

The choice of prosthetic knee must be the subject of a medical and paramedical consensus during a medical and technical multidisciplinary consultation, following approval of a specific rehabilitation procedure.

Further reading