

THE ORTHOPAEDIC SCOOTER

AN ENERGY-SAVING AID FOR ASSISTED AMBULATION

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The orthopaedic scooter is an alternative to crutches. It gives the patient greater freedom on level smooth surfaces and uses less energy.

Crutches are difficult to use. Problems that rapidly become apparent include fatigue and soreness of the hands, axilla and chest wall. The hands cannot be used for other purposes and occasionally a carpal tunnel syndrome develops. The orthopaedic scooter can, in many situations, liberate the patient from crutches. It is a lightweight device which, with the knee flexed, supports the shin (Fig. 1). It is easily steered with knee pressure, leaving the hands free and it allows more mobility than crutch-walking. We have compared the energy expenditure of walking with crutches and walking with the scooter.

METHODS

Sixteen fit volunteers with an age range of 21 to 40 years (mean 25), familiarised themselves with walking non-weight-bearing on one limb on a treadmill using axillary crutches, elbow crutches and the orthopaedic scooter. Each volunteer then walked at three kilometres an hour for five minutes on each device in random order. During this period their gas exchange was monitored using an Oxycon-4 gas analyser and they were asked to give their rating of perceived exertion (RPE) each minute. The RPE is a score determined by how hard the subject finds the exercise; a score of seven represents 'very, very light' work and 19 'very, very hard' work (Borg and Noble 1974).



Fig. 1

The orthopaedic scooter.

RESULTS

The energy expenditure and the mean RPE for normal walking and walking using each device are presented in Tables I and II. Using the paired *t*-test there was a highly significant difference in both the energy consumption and the mean RPE between using the orthopaedic scooter and either type of crutch ($p = < 0.0001$). The scooter required 25% less energy expenditure than crutches.

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Table I. Energy expenditure while walking

Method of walking	Mean expenditure Kcal/kg/hr (s.d.)	Per cent of normal expenditure
Normal	2.8 (0.54)	100
Orthopaedic scooter	4.8 (1.01)	171
Elbow crutches	6.6 (1.63)	236
Axillary crutches	6.5 (1.23)	232

Table II. Rating of perceived exertion (Borg and Noble 1974)

Method of walking	Mean score (s.d.)
Normal	6.7 (0.6)
Orthopaedic scooter	10.3 (1.3)
Elbow crutches	13.0 (1.8)
Axillary crutches	12.6 (1.6)

There was no significant difference in energy consumption ($p = 0.44$), or mean RPE ($p = 0.31$) between the two types of crutch.

DISCUSSION

McBeath, Bahrke and Balke (1974) showed that axillary and elbow crutches required similar energy expenditures. Our study confirms this and demonstrates that both the actual and the perceived work of walking are significantly reduced using the orthopaedic scooter. It also has other advantages: the hands are free for other uses, the injured foot is elevated and not dependent as it is with crutches, body-weight is distributed through both legs and the proximal muscles of the injured leg are used extensively which may help to preserve muscle bulk and bone strength. The scooter is particularly valuable in the

rehabilitation of patients with ankle and foot injuries who must remain non-weight-bearing. It has also been used successfully in the treatment of patients with diabetic plantar ulcers as an alternative to bed-rest or contact plasters (F. I. Tovey, personal communication).

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