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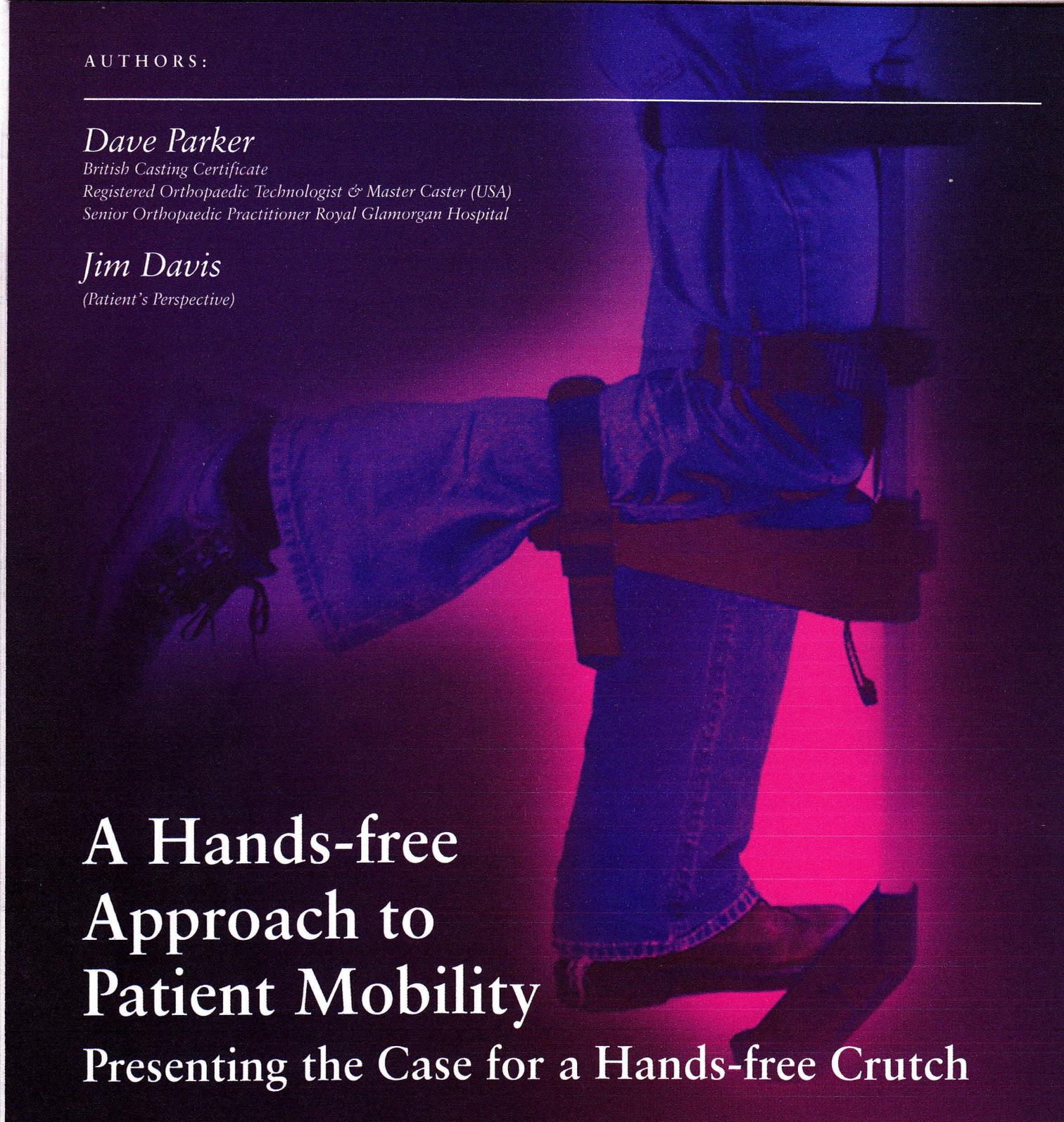
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# A Hands-free Approach to Patient Mobility

## Presenting the Case for a Hands-free Crutch

**Dave Parker, Senior Orthopaedic Practitioner at the Royal Glamorgan Hospital near Cardiff, discusses the advantages to patients that he has found in the use of a hands-free crutch system, invented and pioneered in Canada and now available in the UK. He also outlines the clinical research that has been carried out that supports his anecdotal experience with evidence that the use of the iWALKfree crutch can significantly improve patient mobility and reduce hospital stays.**

### **Patient Challenges**

One of the biggest challenges facing patients following an injury to the foot or ankle is keeping the weight off their affected leg while it heals. While patients generally appreciate that failure to do so can exacerbate the injury and impede their recovery, abiding by this requirement is often much more difficult in practice.

Some of the problem is lifestyle-related: the patient may be used to leading an active life, have family commitments that require them to get around or be under pressure to get back to work. As a result, patients will often plead for a reduced time Non-weight-bearing (NWB) or Partial-weight-bearing (PWB) in the belief that they simply will not be able to survive for weeks without walking. Even for those patients that take a more stoical view, the reality of coping with their reduced mobility can cause issues with their recovery. The conventional approach to providing a level of mobility whilst avoiding putting weight on the affected lower leg by providing crutches can prove awkward and painful for many patients and offers only limited mobility, particularly on stairs. This sometimes causes the patient to 'cheat' by putting weight on the affected limb from time to time or discarding their crutches before the required period outlined by their Consultant/practitioner.

Furthermore, even for patients that do not fall into this category, conventional crutches do not preclude the user from putting weight on the injury if they are struggling to balance or impatient to get around.

For NWB and PWB patients that have also suffered an upper body or upper limb injury or have some weakness, conventional elbow crutches are not suitable at all. Not only is the resulting lack of mobility frustrating for the patient, it may also result in a prolonged hospital stay, which is a drain on resources and may even affect the patient's feelings of well-being, and in turn, hold back their recovery.

### A hands-free Approach

It has not been often in my 25 years of orthopaedic practice that I have come across a device that is straightforward in its concept, simple in its construction and use and yet proves so effective. I love smart well thought out design and the iWALKfree hands-free crutch seemed to tick all of the above boxes and I therefore decided to take a closer look at it.

Walking aids such as crutches have been in use for centuries. They were even depicted in Egyptian tombs as far back as 2830 B.C. (Ebstein 1972) Throughout history, various crutch types have been introduced and utilized for patients with restricted weight bearing. (LeBlanc et al 1993; Andrews et al 1994). The Standard Axillary Crutch (SAC) are predominately used in North America and many countries world-wide. In the United Kingdom elbow crutch are more commonly used. This could be due to cost, however according Wagstaff (1984) the change from Axillary to Elbow crutches in Britain is owing to the possible complications arising from their use. It is well documented that SAC can cause bilateral brachial plexus compressive neuropathy (Raikin and Froimson 1997) and axillary artery aneurysms (Tripp and Cook, 1998). Prolonged use can even result in shoulder joint degeneration (Shabas and Scheiber, 1996) and carpal tunnel syndrome (Johnson et al 1962). Therefore an ambulatory system not involving the upper body would seem ideal solution for patients to safely mobilize.

Developed in Canada, by a farmer who needed to return to work despite a calcaneal fracture, the iWALKfree mimics the peg leg that was used in the past for individuals suffering from leprosy and amputation.

It is a CE-marked, Class 1 medical device that has now been in common use in North America for 11 years. I first became aware of it from a patient who demonstrated remarkable freedom when mobilising with an injury treated in a below knee cast in our hospital. He documented his experiences in this blog:-

[http://community.tigranetworks.co.uk/blogs/tim\\_long/archive/2011/03/01/i-walk-free.aspx](http://community.tigranetworks.co.uk/blogs/tim_long/archive/2011/03/01/i-walk-free.aspx).

The device is designed to strap securely to the patient's thigh and is fully adjustable to suit their individual requirements. Fabricated from lightweight polymer material with an extruded aluminium main beam, it has a platform to support the leg, transmitting the patient's weight from the knee to the crutch. This robust and adjustable design means that it is suitable for almost any NWB or PWB patient, even if they also have upper-body injuries. Within a short space of time, most find that they can balance well on the crutch and are able to walk, go up and down stairs and even sit down without removing the device, giving them a much more normalised mobility. In brief, it means that they can, for the most part, get on with life while being NWB, thus their injuries heal which speeds up their recovery by improving their feelings of well-being.

The hands-free crutch allows the injured lower leg to be rested on a moulded shelf and strapped into position. This means that the device actively ensures that patients follow their NWB instruction and do not set back their recovery putting weight on the affected leg.

### Clinical Research Results

As part of my initial research into the iWALKfree, I looked into the clinical research that had been performed to support the use of the system and discovered that three studies have been carried out, two in Canada and one in the United Kingdom at the Hull Royal Infirmary and Whipps Cross University Hospital, London.

The Canadian studies were very in depth, Nagpurkar & Troeller were comparing the energy used to ambulate between standard axillary crutches and the hands free crutch and the other was a clinical evaluation of axillary crutches versus the Hands free model using SF-36 and MFAI surveys. (The SF-36 is a validated general health status measurement instrument for which US normative data is available and the MFAI survey was developed specifically for evaluation of outcomes following traumatic musculoskeletal injuries.)

The Rambani/Saleem Shahid/Goyal study, (2007) is the clinical research on the subject with the largest control group and, for me, the most interesting, as it focuses specifically on NWB and PWB patients with musculoskeletal injuries who also had an upper body injury. The 80 patients involved in the study were aged between 18 and 54, had both upper and lower limb injuries, were unable to use elbow crutches and had no head injury or other condition that could cause vertigo. Half the control group were provided with a hands-free crutch and all patients were evaluated with the help of a musculoskeletal functional Assessment (MFA), after a six-week trial.

This clinical research was able to quantify the reduction in hospital stay required for such patients when they are provided with a hands-free crutch to enable them to recover their mobility. For the study group, the average hospital stay for those using the hands-free crutch was 2.3 days (range of 1-5 days), compared to an average hospital stay of 6.7 (range 4-14) days for those without the hands-free crutch. Clearly, this not only has significant implications for the well-being of the patient but also for the cost and management issues associated with pro-longed hospital stays. Furthermore, the patients using the hands-free crutch demonstrated better MFA scores ( $p < 0.05$ ), exhibiting better coping, a trend towards better lower extremity function and improved ability to perform everyday tasks around the house.

### Conclusion

All three studies indicated a need for further research on long term use with regards to knee extension, swelling, and other soft tissue problems but all came to a similar conclusion that the hands free crutch is a viable alternative for patients to be non weight bearing during ambulation.

The research also considers the implications of using a hands-free crutch for hospital stay periods, using a control group with both upper and lower limb injuries.

While these results are compelling, it is also important to consider the effects on morale and well-being for all patients with NWB and PWB injuries and the practical assistance that the hands-free crutch can provide in helping them to get back to normal following an injury.

**An example of the iWalkfree in action - a patient's perspective**

**Patients Account**

As a 71-year-old sailing enthusiast, I don't let my age stand in the way of my plans to make the most of my leisure time and I not only enjoy sailing but also go bike riding and am currently refurbishing a yacht. So when I injured my Achilles tendon and had to have my lower leg put in plaster for eight weeks I was prepared to consider anything that would help me to heal quicker and get on with life.

My injury was one of those out-of-the-blue accidents. Where we live in Milford-on-Sea we're on a hill so when the car had a flat battery I thought I might be able to get it started if I could get it going down the hill and put my leg out of the door to give it a push off. The force and the awkward angle tore my Achilles tendon creating a 20mm gap and I ended up with my lower leg in plaster for eight weeks, with a surgical boot to look forward to after that.

My doctors decided not to operate because of my age and I was sent home with elbow crutches but I found them inconvenient and uncomfortable, not least because we live in a split level house so even getting around on the ground floor involves going up and down steps. My mobility was so restricted on the crutches that I nearly injured myself again! I decided to have a look online to see whether there was an alternative and that's when I came across the hands-free crutch.

Once equipped with my hands-free crutch I was not only able to move around the house freely – even up and down stairs – but was also able to get back to my boat refurbishment project. The specialist told me that if I wanted to sail again I'd need to keep off the leg for at least eight weeks but I couldn't face the idea of sitting around for such a long time. Thanks to the hands-free crutch I've been able to follow doctor's orders and get on with stuff so hopefully I'll not only be able to sail again but I'll also be able to get the boat finished ready for the sailing season this summer. In fact, my consultant can't believe how quickly I've healed: I've been able to get the boot off early and I think that's down to the continued mobility I've had thanks to my hands-free crutch.

**Postscript**

I have not been paid or otherwise incentivised to write this article and when I started to write and research it I did not think in my wildest imagination that I would be using and testing the hands free crutch for myself. Unfortunately I ruptured my Achilles tendon in June 2011(don't ask!) and after having surgical repair was discharged home NWB with elbow crutches. It's not until you experience NWB for any length of time that you begin to appreciate how difficult and exhausting it is. The trail of spilt drinks and food from my kitchen to the living room floor is evidence of this. If it weren't for the hands free crutch it would have been virtually impossible to stay independent and survive by myself. Simple day-to-day living becomes a major act of logistical thinking, from preparing food to having to 'Fosbury flop' into the bath! Having my hands free made the world of difference, and being able to rest my leg down on the crutch took the strain off the opposite hip and also stopped my back from aching. With practice I could use the stairs safely and the mile walk into the village was not such an exhausting experience. I shall in the future have more empathy for the NWB patients I treat and have full understanding of their needs. Our job as practitioners is not simply to help our patients recover but to ease that recovery in any way we can, and making them aware that there is an alternative to normal crutches should, I believe, be part of that good practice.

**References:**

Andrews BJ, Grana MH, Heller BW, MacMahon J, Keating L, Real S.(1994) Improved harness crutch to reduce upper limb effort in swing-through gait. *Medical Engineering and Physics* 16:15-18

Dalton A , Maxwell D , Kreder H J , Borkhoff C M . Prospective Clinical Evaluation Comparing Standard Axillary Crutches vs. The Hands Free Crutch  
Sunnybrook & Womens College Health Sciences Centre, University of Toronto

Ebstein S (1972) The Classic Art, History and the crutch, *Annals of Medical History.* 1937,9:304-313

Johnson EW, Wells RM, Duran RJ. ( 1962) Diagnosis of carpal tunnel syndrome. *Archives of Physical Medicine and Rehabilitation* 43:414-419

LeBlanc MA, Lawrence CP, Nauenberg T (1993) A quantitative comparison of four experimental axillary crutches. *J Prosthet Orthot* 5:40-49

Nagpurkar A , Troeller A . An Evaluation of Crutch Energetics using standard and 'Hands Free' crutches . *Clinical Biomechanics*, University of Guelph, Canada HK-407

Raikin S, Froimson MI. (1997) Bilateral Brachial Plexus Compressive Neuropathy (Crutch Palsy ) *Journal of Orthopaedic Trauma*;11:136-138.

Rambani R . Shahid M S. Goyal S. (2007) The use of a hands free crutch with musculoskeletal injuries:randomised control trial. *International Journal of Rehabilitation Research.* ; 30:357-359.

Shabas D, Scheiber M. (1996) Suprascapular neuropathy related to the use of crutches . *American Journal of Physical Medicine*; 65:298-300

Tripp HF,Cook JW . (1998) Axillary Artery Aneurysms . *Military Medicine* ;163:653-655

Wagstaff PS (1984 )The energetics of walking using axillary crutches and the prototype of a new design termed the Dublin crutch. *Physiotherapy* 70:422-424