

# Development of a postural support device for cross-table radiography of the extremities

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## Introduction

A postural support device (\*RSA Registered Design Application No. F2002/0033) was originally developed to provide immobilisation for patients requiring cross-table radiography of the hip joint. On further investigation it was found that it had additional applications, as discussed later.

## Background

The routine projections for fractures or dislocations of the hip joint include the antero-posterior projection of the pelvis and the cross-table



Fig. 1a. Supine pelvis.



Fig. 1b. Cross-table lateral of the hip joint demonstrating the femoral neck.

lateral projection of the neck of the femur (Figs 1a and 1b).

In order to demonstrate the neck of the femur, the unaffected leg has to be raised and supported. Radiographers have traditionally used a chair, stacks of soft pads, an individ-

ual, or the X-ray tube to support their patients.

In 1998 a national survey, utilising self-completing questionnaires was conducted amongst 54 radiographers working in public and private hospitals. Respondents were required inter alia to indicate the type of support that they were using, the categories of patients seen, what the repeat rate was and whether they thought their method of support was safe. This survey contributed to a needs analysis for consideration of marketing the device.

## Results

Forty-one (79.5%) of the 54 questionnaires were returned. They were statistically analysed and revealed the following information (Tables I - IV).

From the above results it can be seen that a large percentage of adults required radiography of the hip joint. One practice had a specially designed support but it was not height adjustable. Whilst 56.1% of respondents did not have to repeat the radi-

**Table I. Patients most often/equally seen (rating = 1)**

Category	Percentage
Geriatrics	63.4
Adults	56.1
Juveniles	10.5
Infants	15.8

**Table II. Method of support (combined figures)**

Support	Number	Percentage
Box	14	34.1
Chair	9	21.9
X-ray tube	22	53.7
Assistant	18	43.9
Specially designed support	1*	2.4

\* Not height adjustable.

**Table III. Repeat radiographs due to poor support**

Response	Percentage
Yes	43.9
No	56.1

**Table IV. Is your current support safe?**

Response	Percentage
Yes	28.6
No	71.4

ographic projection, 71.4% of the respondents did not regard their current support as being safe.

## Current problems

A chair is: (i) cumbersome; (ii) not height adjustable in most cases; and (iii) difficult to place outside the area of interest.

The leg on the X-ray tube means that: (i) the patient feels insecure; (ii) the leg has to be shifted several times when the height of the X-ray tube is adjusted — patients may not be wearing shoes and may sustain a burn to the heel; and (iii) the foot is exposed to radiation due to its close proximity to the exiting beam.

An assistant has: (i) unnecessary exposure to radiation; (ii) back strain; and (iii) difficulty experienced in immobilisation.

## Repeat radiographs

The major contributing factors for repeat radiographs are as follows: (i) superimposition of the soft tissues of the unaffected limb on the structure being demonstrated; and (ii) motion-unsharpness due to discomfort experienced by the patient.

## Solution

During 1996 the idea of a leg support was disclosed to the Research and Ethics Committee of the Medical University of Southern Africa. The prototype was designed in 1997. The device was tested at Ga-Rankuwa Hospital's X-ray department. The management of the university also recommended that an application for a design protection be lodged. The final product was manufactured in 2002 (Figs 2a and 2b). Fig. 3 illustrates the application of the device during cross-table lateral radiography of the hip joint. The device may also be used during cross-table radiography of the lower limb (Fig. 4), and cross-table radiography of the shoulder (Fig. 5).

## Versatility

Orthotists, prosthetists, occupational therapists, orthopaedic surgeons and plastic surgeons can also

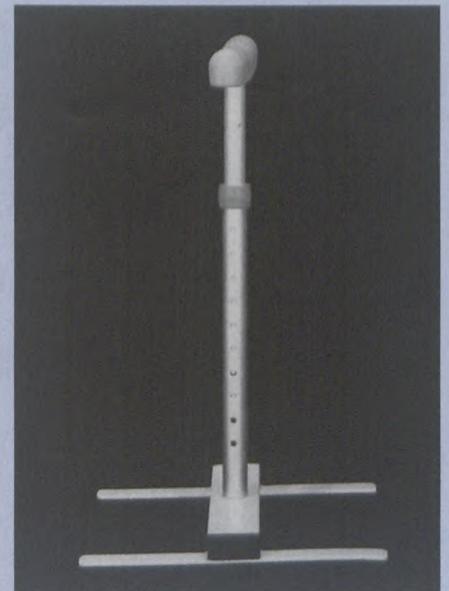


Fig. 2b. Side view of the postural support device. Note: The device is: lightweight (1.5 kg), height adjustable (43 - 66 cm), portable, safe and aesthetically attractive.



Fig. 3. Positioning for cross-table lateral radiography of the hip joint using the postural support device.



Fig. 2a. Elevation view of the postural support device.



Fig. 4. Positioning for cross-table lateral radiography of the lower leg.



Fig. 5. Positioning for cross-table lateral radiography of the humerus (axilla) using the postural support device.

use the device when fitting appliances, traction or dressings.

### Outcomes

The application for design protection through the Medical University of Southern Africa resulted in: (i) the

compilation and institution of an Intellectual Property Policy at the Medical University of Southern Africa; and (ii) the submission of a Portfolio of Evidence entitled 'Intellectual Property — An Inventor's Perspective' as partial fulfilment of a MSc in Diagnostic Radiography offered by the Anglia Polytechnic University, Cambridge, United Kingdom.

I would like to thank the management of the Medical University of Southern Africa for their support, Professor H S Schoeman for his assistance with the statistical analysis, Mr J Van Loggenberg for the manufacture of the prototype, Mr Grant Pywell of ASG Medical Equipment Services for

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