

Use of the Unicam Pro 3 in Knee Rehabilitation

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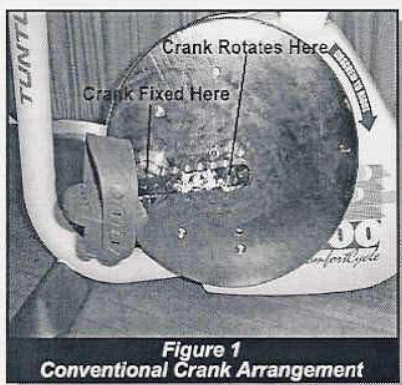
The Unicam Pro 3 device allows the pedal and crank arrangement of either a bicycle or a cycle ergometer, to be adjusted. The cycle can then accommodate anomalies of lower limb range of movement and strength.

Limited Knee Flexion

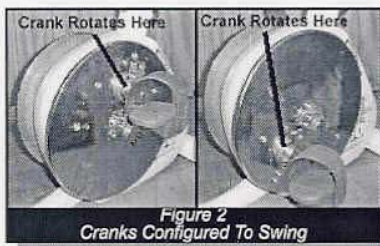
Cycling is a commonly used exercise in lower limb injury rehabilitation but is made difficult when the injury concerned involves limited knee flexion. When using an unmodified cycle, the only way of accommodating such joint stiffness is to raise the cycle seat. However, this type of adjustment is not sufficient to accommodate moderate to severe degrees of joint stiffness.

The Unicam Pro 3 has adjustable length cranks (the bits between the pedals and the spindle around which they rotate) which can accommodate limited ranges of knee flexion. The pedals and cranks can be set in a conventional fashion as shown in figure 1 and the device then works in exactly the same way as a normal cycle. When dealing with limited knee flexion, the simplest way of using the Unicam Pro 3 is to decrease the distance between the pedal and the spindle i.e. by shortening the crank. In this way the foot scribes a relatively small circle around the axis of the spindle and thereby reduces the amount of knee flexion that is required to perform the cycling action.

Another way in which limited knee flexion can be accommodated is



to position the cranks so that they swing (see figure 2). Such a set up means that the pedal of the affected side does not pass above the axis around which it rotates. In this way the foot of the affected limb does not have to travel in an orthodox circular fashion around the spindle and so push into limitations of knee flexion at the top of the rotation.

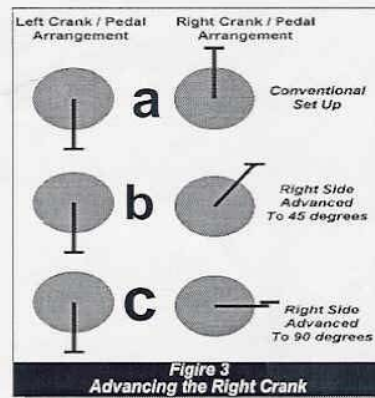


When dealing with restrictions of knee flexion, the Unicam pro 3 enables cycling to be introduced as a rehabilitation exercise earlier than would otherwise be possible. As improvements in range occur the Unicam Pro 3 can be adjusted accordingly until finally the set up of the cranks and pedals matches that of a standard cycle.

Reduced Strength

The load placed upon the lower limbs during cycle exercise is dependant upon the applied resistance and upon the position of the pedals in relation to one

another. With a standard pedal / crank arrangement, the pedals are placed in diametrically opposite positions. The Unicam Pro 3 can be adjusted to either advance or retard the position of one crank / pedal in relation to the opposite side. Figure 3 illustrates the relative positions of each pedal when they are set into conventional positions and when the right side is advanced by 45 degrees and then by 90 degrees. Table 1 summarises the effect that these changes have on the exercising limbs.



RIGHT CRANK POSITION	EXERCISE EFFECT ON Rt LOWER LIMB	EXERCISE EFFECT ON Lt LOWER LIMB
STANDARD (Fig 3 a)	Equal to Left	Equal to Right
ADVANCED 45° (Fig 3 b)	Reduced Extension Effort	Increased Extension Effort
ADVANCED 90° (Fig 3 c)	Minimal Effort.	Increased Flexion & Extension Effort