

# Chrisofix®

IMMOBILISING CARPAL TUNNEL ORTHOSES  
GOOD CHANCE TO AVOID SURGERY

IMMOBILISING ELBOW ORTHOSIS  
INSTEAD OF CASTING (POP)



IMMOBILISING THUMB  
SADDLE JOINT ORTHOSES



REUSABLE  
SHELLS



CIRCULAR STABLE FIXATION  
IMMOBILISATION WITH ORTHOSIS  
IN SECONDS  
WITHOUT WATER OR HEAT

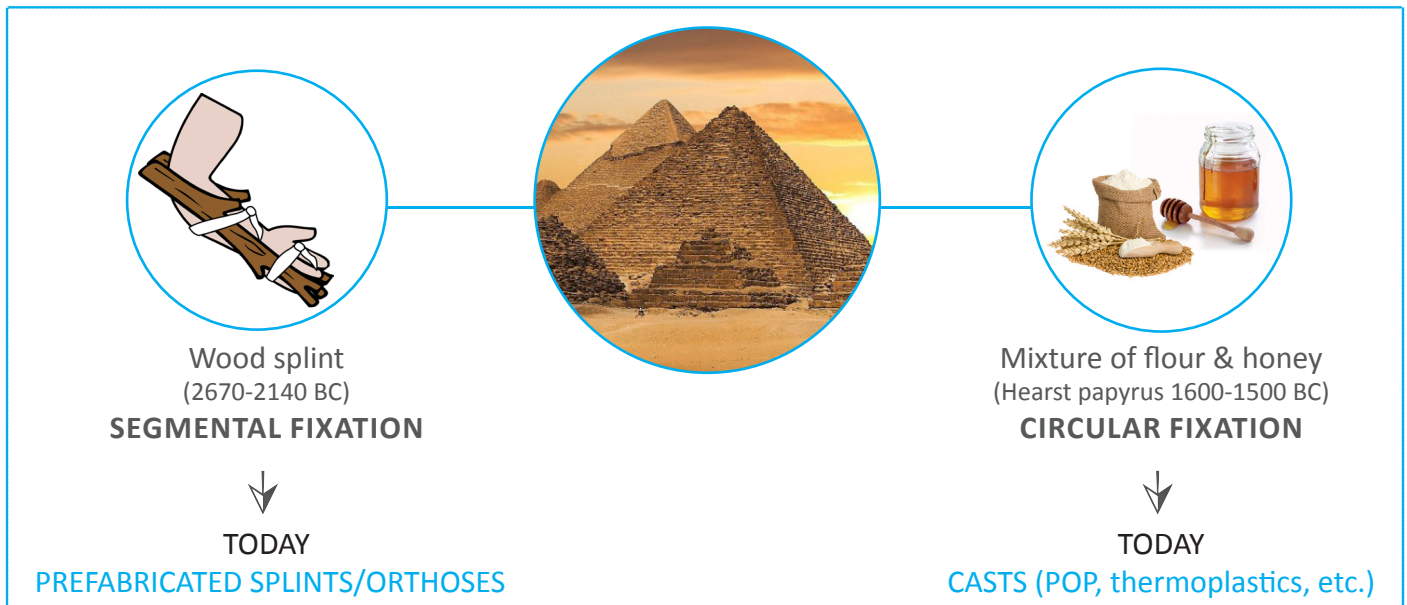
IMMOBILISING  
SCAPHOID ORTHOSIS



FINGER  
SPLINTS



PATENTED TECHNOLOGY, INNOVATIVE SOLUTIONS



The lack of a material which is stable and formable at the same time has evoked the impression, that there is no possibility to combine the most important advantages of the two pathways, i.e. the:

**QUICK APPLICABILITY**  
**POSSIBILITY OF INTERMITTENT WEARING**



**CIRCULAR STABLE FIXATION**  
**POP-LIKE IMMOBILIZATION**

The Chrisofix® technology\*- providing a material stable and formable at the same time - is the first fixation method resulting in a quickly applicable **semicircular stable fixation** or combined with a special standalone immobilizer fixation device (patent 2010) in a **circular stable POP(Plaster of Paris)-like immobilization**,

### THE UNIQUE PROPERTIES OF CHRISOFIX® PRODUCTS

- Chrisofix® orthoses ensure semicircular or POP like immobilising
- they are adjustable and re-adjustable without water or heat, in seconds.
- All of them are stable and moduable at the same time.

### ADVANTAGES BY USING THE CHRISOFIX® PRODUCTS

- Earlier unrealisable therapeutic ideas become part of daily therapy (splinting of rib fracture).
- Time-saving by replacing thermoplastic products.
- Replacement of the POP or any similar fixations by Chrisofix® POP like immobilising circular stable orthosis enables an earlier start with physiotherapy and ensures more convenient daily hygiene.

In contrast to conventional splints/orthoses in which the stable component is usually restricted to a lineal (segmental) part (fig. 1), the Chrisofix® products uniquely have a stable and even formable **semi-circular** core (Fig. 2) fixed to the limb with usual textile straps or bandages.

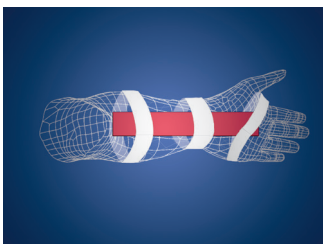


Fig. 1

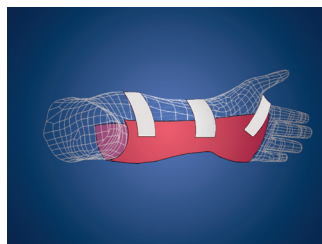


Fig. 2

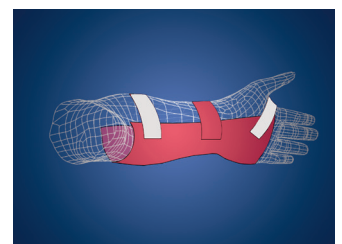


Fig. 3

Replacing at least one of the usual straps with the Chrisofix® **Fixation Device (patented: 2010)** for fixing the limb to the orthosis, the semi-circular fixation became to POP-like immobilizing circular fixation (Fig. 3), which is stable and formable at the same time as well as adjustable without water or heat, in seconds.

These orthoses ensure stable semicircular fixation with textile straps. Covered with green velour and a white cotton layer, inside respectively. Both surfaces of the wind-up splints are covered with green polyethylene.

- Applicable & (-re) adjustable in seconds without water or heat.
- The splints are X-ray permeable, breathable, light and comfortable.



### Chest Orthosis

Chrisofix® provides the only real possibility for rib fracture splinting

- immediate pain reduction
- accelerated recovery of respiratory functions
- shorter hospitalization
- reduced risk of pneumonia

[www.brokenribs.eu](http://www.brokenribs.eu)

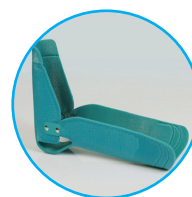
## RESTING SHELLS/ORTHOSES FOR FIRST CARE IN HOSPITALS

Temporary castings are frequently, even repeatedly used technic during first care of injured and/or surgically treated extremities. To replace them, Chrisofix® offers a **more economical solution**: unique forms of preformed shells or orthoses. Both types are applicable and re-adjustable (even directly on the patients). The core of shells and orthoses are stable and formable at the same time.

**The Shells for First Care** have a formable semicircular core covered both sides with polyethylene. They will be bandaged to the limb, their surfaces can be disinfected and reused even by different patients. Exchangeable terry-cloth liners (5 pieces) will be delivered with the shells. These can be substituted with any other material. Only inlay and bandaging have to be changed patient by patient.



Upper limb



Lower limb

**The Orthoses for First Care** ensure stable semicircular fixation with textile straps (Basic version) or POP (gypsum)-like circular stable one if immobilisation is necessary. In such cases, at least one of the textile straps has to be exchanged to Chrisofix® Fixation Device (aluminium containing strap). Both versions are breathable, covered with green or blue velour and a white cotton layer, respectively.



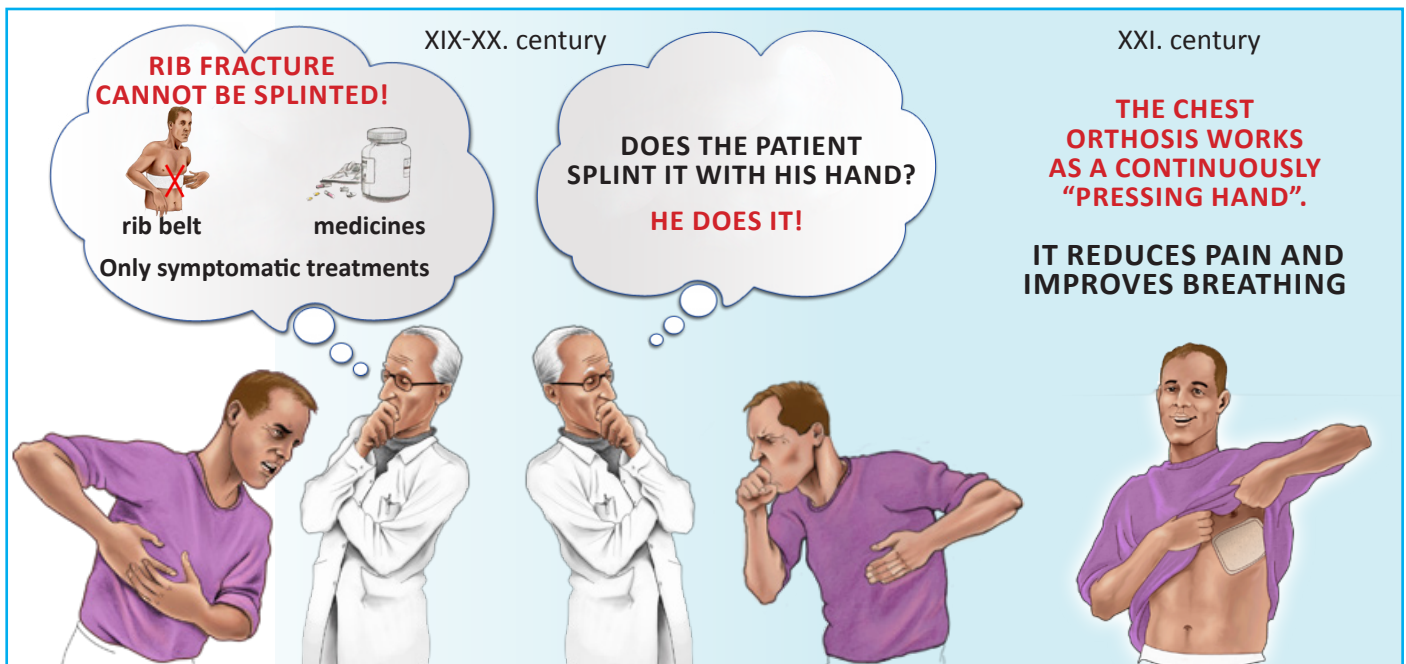
Upper limb



Lower limb

While Chrisofix® Orthoses for lower limb are limited to the "resting period" (not for walk!), an upper limb orthosis adequately selected for first care, can be used during the whole recovery period.

RIB FRACTURE INCIDENCE WORLDWIDE 0,2-0,3 % OF THE POPULATION



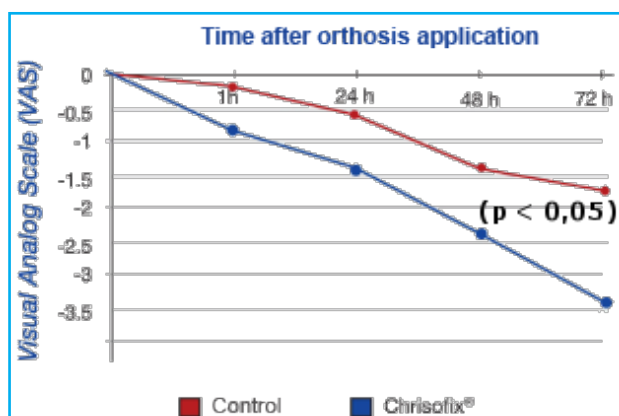
### CLINICAL STUDY RESULTS WITH CHEST ORTHOSIS



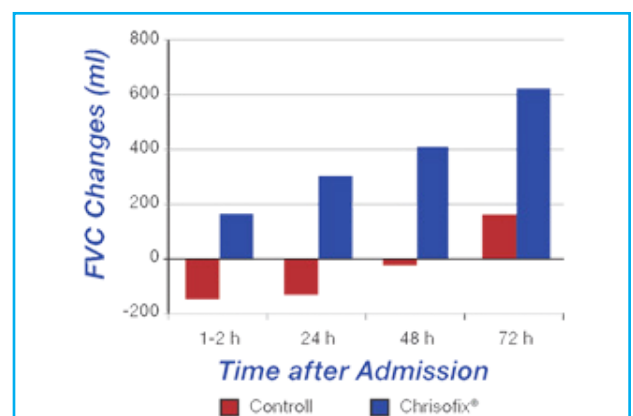
#### QUICKER PAIN REDUCTION

- Accelerated recovery of respiratory function<sup>1</sup>
- Shorter hospitalization<sup>2</sup>
- Reduced risk of pneumonia
- Less painkiller
- Transparent to X-rays
- The patient can take a shower with it

The pain is reduced significantly after rib splinting.  
(Visual analog scale decrease from 10)



The respiratory flow volume increases quicker in splinted patients than in the controls ( $p < 0,01$ )



1. L. Zsiros, Z. Záborszky, et al.: Easy and effective method for the treatment of rib fracture by using Chrisofix®-technique. 7th European Trauma Congress, Ljubljana, 2006, Int. Proceeding: 387-390.

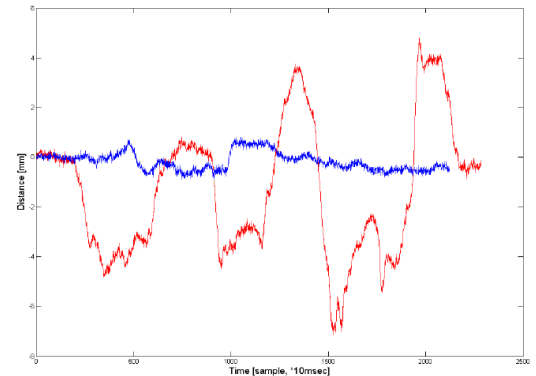
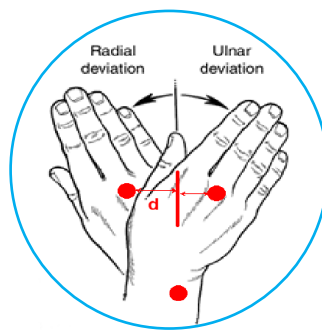
2. T. Mészáros, A. Sárváry et al.: Use of chest Orthosis can significantly shorten the hospitalization of rib fracture patients. 7th European Trauma Congress, Ljubljana, 2006, Int. Proceeding: 279-282.



### POP AND SIMILAR FIXATIONS CAN FREQUENTLY BE REPLACED BY IMMOBILISING CHRISOFIX® ORTHOSES (COMBINATION WITH “IMMOBILIZER FIXATION DEVICE”)

The combination of semicircular Chrisofix® orthoses with the patented standalone Chrisofix® Fixation Device ensures a stable POP-like circular fixation. i.e. immobilising-orthosis. All these products can be applied and readjusted within seconds without water or heat. They are breathable, light and comfortable.

The material/s and structure of the orthosis and straps are deciding for the stability of fixation. It is illustrated by the movement of a hand fixed to the same semicircular Chrisofix® orthosis core either with textile straps or with the standalone aluminum containing fixation device (strap). The difference in the grade of movement inhibition (textile: red, fixation device blue curve) is presented.

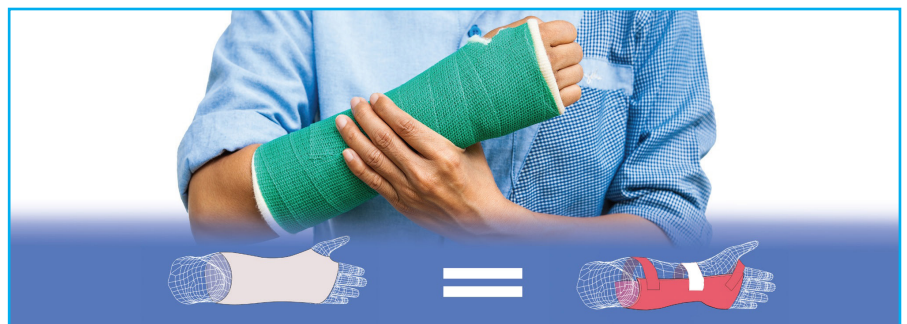


Consequently, depending on the physician's judgment and the patient's compliance:

**fixations with POP (plaster of Paris), thermoplastic techniques and similar castings can frequently be replaced with Immobilising Chrisofix® Orthoses.**

Immobilisation after hand surgery, various upper limb fixations for fractures, e.t.c., can belong to the indication field of Chrisofix® Immobilising-Orthoses. Even minimal shortening of POP (gypsum)-fixation could be very important for the patient's wellbeing. It is resulting in e.g.

- earlier start of physiotherapy and
- more convenient daily hygiene



#### Upper limb fracture-related indications

- Non-dislocated fractures.
- Fracture without osteosynthesis:  
After 4-6 weeks (depending on callus formation) the POP can be changed to immobilizing Chrisofix® Orthosis
- Fracture after internal stabilization (fixation) with screw or plate:  
Immobilising Chrisofix® Immobilising-Orthosis can be applied immediately after surgery

The immobilising Chrisofix® Orthosis can preferably be used even instead of all frequently used conventional orthoses in the hand surgery. In contrast to the conventional orthoses which stable and formable character is restricted only to its segmental splint component, both, the semicircular stable Chrisofix® orthoses and the immobilising ones are stable and formable at the same time. Due to the extended stability, the use of these Chrisofix® orthoses results in increased safety, too. Their application can be performed similar to all others within seconds without water or heat.

### MALLET FINGER SPLINT



**For immobilisation of the distal interphalangeal (DIP) joint**

Well adjustable to the form of finger, and due to textile lining it is more comfortable than whatever pure plastic mallet finger splint version.

### FINGER SPLINT



**For simultaneous immobilisation of the proximal (PIP) and distal (DIP) interphalangeal joints**

The semicircular stable and even bendable, well adjustable splint excludes the possibility of a non-wanted shifting of the phalanges; due to the real immobilisation accelerates the wound healing.

### METACARPAL ORTHOSES



**For immobilisation of MCP (metacarpo-phalangeal) joint without or with the interphalangeal ones**

The bendable splint allows to set the angle at the MCP joint according to the requested position. The movement of the wrist and the not injured fingers remains free.

### THUMB ORTHOSIS



**For immobilisation of the MCP (metacarpo-phalangeal) joint of the thumb**

Fixation of the metacarpophalangeal joint of the thumb in case of injuries (e.g. strain or sprain), inflammation (e.g. tenosynovitis), degenerative diseases and following surgery.

### METACARPAL ORTHOSIS FOR FINGERS IV-V



**Combined immobilisation of the IV-V metacarpo-phalangeal joints**

Due to the circular stable fixation of the IV-V MCP joints a virtual immobilisation can be ensured. The wrist and all other joints of the hand remain completely free.

### WRIST & METACARPAL ORTHOSIS FOR FINGERS IV-V



**For immobilisation of the wrist and the basic (MCP) joints of fingers IV-V.**

The combination of the semicircular stable Chrisofix orthoses and the Fixation Device ensures POP like immobilisation of the wrist and the basic (MCP) joints of the fingers IV-V, after injuries and following surgery on flexor tendons or osteosynthesis.

### PALMAR FOREARM ORTHOSIS



**For semicircular stable fixation or immobilising of the wrist, hand, and fingers.**

For first aid and first care (transitory fixation before or just after surgery). Combination with Fixation Device ensures POP-like immobilization of the targeted joints of the wrist, hand, and fingers after injuries, surgery and fixation with POP. Conservative treatment in tendonitis, inflammation and degenerative diseases.

### PALMAR FOREARM ORTHOSIS WITH THUMB SUPPORT



**For immobilisation of the wrist, hand, fingers and thumb**

First aid and first care (transitory fixation before or just after surgery). Semicircular fixation or immobilisation of the wrist, hand, thumb and fingers after injuries (e.g. distortion), surgery and fixation with plaster of Paris. Conservative treatment in tendonitis, inflammation and degenerative diseases.

### PALMAR FOREARM ORTHOSIS FOR SPASTIC PARESIS



**For immobilization of the wrist, hand, and fingers**

To stabilize the position achieved with the physiotherapy.

### WRIST ORTHOSIS FOR CTS



**First of all for nightly immobilisation of the wrist** In Carpal Tunnel Syndrome (CTS). It can be used in hand surgery after injuries (e.g. distortion), surgery and fixation with plaster of Paris. Conservative treatment in tendonitis, inflammation and degenerative diseases of the wrist. Rehabilitation phase after fractures and hand surgery.

### FUNCTIONAL WRIST ORTHOSIS FOR CTS



**Immobilisation of the wrist (CTS) for daily activities**

Immobilisation of the wrist for Carpal Tunnel Syndrome during daily activities. It is indicated also after injuries (e.g. distortion), surgery and fixation with plaster of Paris. Conservative treatment in tendonitis, inflammation and degenerative diseases of the wrist.

### POSTOPERATIVE WRIST ORTHOSIS FOR CTS



**For accelerated recovery after carpal tunnel surgery**

For wound protection after Carpal Tunnel surgery.

### WRIST & THUMB SADDLE JOINT ORTHOSIS



#### **For immobilisation of the wrist and basic (MCP) joint of the thumb**

Immobilisation of the wrist and metacarpophalangeal (MCP) joint of the thumb Especially for habitual nightly immobilization of thumb saddle joint (CMC) osteoarthritis.

### THUMB SADDLE JOINT ORTHOSIS FOR OSTEOARTHRITIS



#### **For immobilisation of the isolated thumb saddle joint osteoarthritis**

Immobilisation of the metacarpophalangeal (MCP) and saddle (CMC) joints of the thumb. Especially for saddle (CMC) joint arthrosis, distortions, post-fracture stages of the thumb and following surgery related to this region, even as night splint.

### FUNCTIONAL WRIST AND THUMB SADDLE JOINT ORTHOSIS



#### **For immobilisation of the basic (MCP) and saddle (CMC) joints of the thumb for daily activities**

Distortions, inflammatory states and states following surgery related to this region and in saddle joint osteoarthritis belong to the indication field.

### EXTENDED THUMB ORTHOSIS



#### **For extended fixation of the thumb basic (MCP) joint**

Partial immobilization of thumb saddle joint (CMC).

Fixation of the metacarpophalangeal joint of the thumb in case of injuries (e.g. strain or sprain), inflammation (e.g. tenosynovitis), degenerative diseases and following surgery.

### ORTHOSIS FOR DE QUERVAIN SYNDROME



#### **For De Quervain's tenosynovitis**

Extended immobilisation of the thumb to the forearm for blocking all possible movements within the synovial sheaths, through which the tendons of the thumb abductors (extensor pollicis brevis and abductor pollicis longus) pass.

### SCAPHOID ORTHOSIS



#### **For immobilisation of the carpal bones**

Immobilisation of the carpal region after injuries, especially in case of Scaphoid fracture. It is recommended before and after surgery, as well.



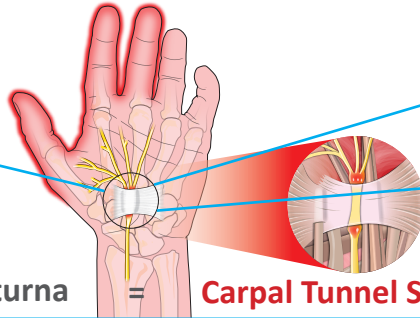
### THE CARPAL TUNNEL SYNDROME (CTS)

is the consequence of a permanently increased pressure – for whatever reason (hormonal disfunction, physical overloading, etc.) – on the **nervus medianus** in the carpal tunnel

The movement of wrist further increases the pressure and the symptoms



XIX. century



XX-XXI. centuries

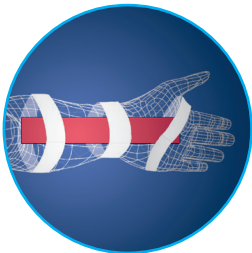


Paresthesia dolorosa nocturna

= **Carpal Tunnel Syndrome (CTS)** > 1% of USA population

### DIFFERENT THERAPEUTIC TARGETS

**Movement inhibition**  
with segmental stable  
orthosis fixation



Pain reduction,  
and partial  
efficacy

**Steroid injection**  
for reduction of  
inflammation



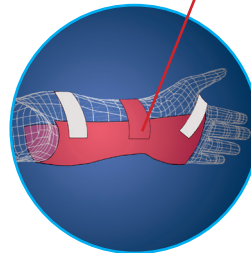
Temporary effect  
with possible  
side effects

**Immobilisation**  
with POP



Not practical

**Immobilisation**  
with Chrisofix  
ORTHOSIS



High efficacy, less  
demand for  
surgery

**Surgery**  
abrogate the  
tunnel character

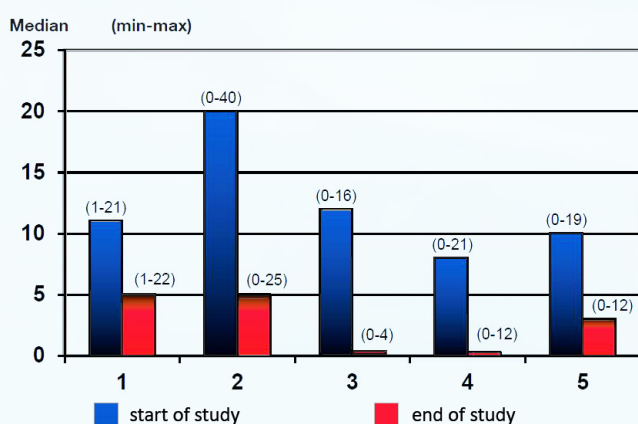


High efficacy, with  
possibility of late  
complications

### CLINICAL RESULTS WITH IMMOBILISING CHRISOFIX® WRIST (CTS) ORTHOSIS

Results based on Boston questionnaire, after 4-6 weeks nightly splinting (n=23)

Leading symptoms: painful paresthesia and frequent wake up nearly disappeared



- 1 = impairment of daily activities
- 2 = symptoms severity scores total
- 3 = wake-up related scores (frequency & severity)
- 4 = pain-related scores (frequency & severity)
- 5 = paresthesia-related scores (frequency & severity)



Wrist orthosis for CTS  
for night and rest



Functional wrist  
orthosis for CTS

The osteoarthritis of the thumb is one of the most frequent degenerative joint disorders. The prevalence of patients with active symptoms is assumed to be about 10% of the population over 60 years. The leading symptom is pain at base of thumb which occurs by grasping or peak-catching.



### EFFECTIVE IMMOBILISATION IS PRECONDITION OF OPTIMAL EFFICACY



Fig. 1

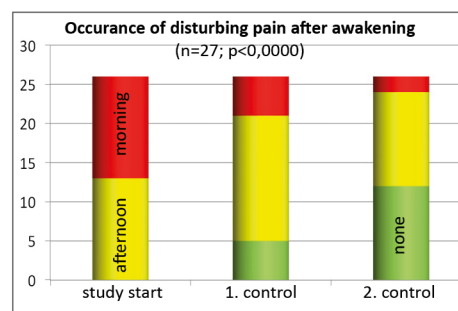
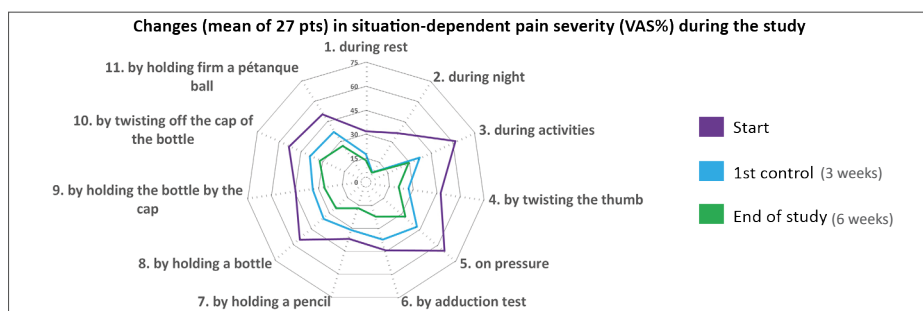


Fig. 2

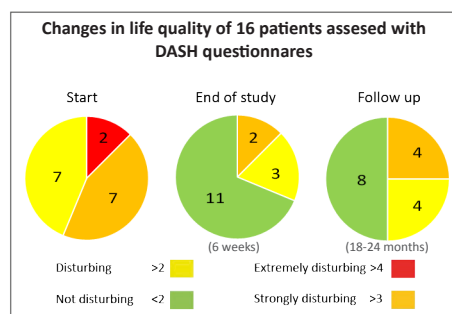
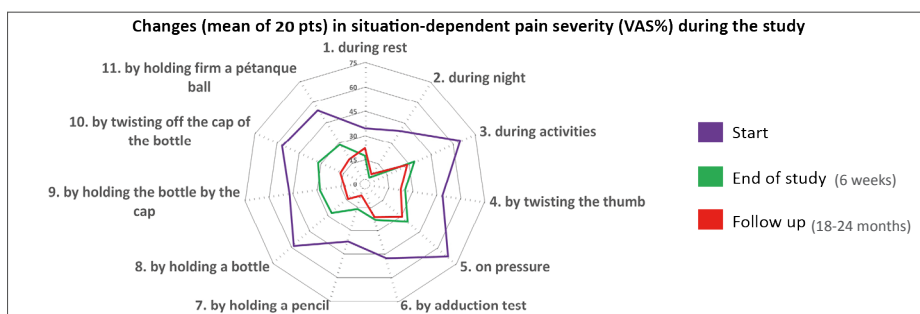


To ensure intermittent immobilisation and free movement periods within a day, belongs to the unique characteristic of Chrisofix® immobilising Orthoses. This fact has predestined the use of thumb saddle joint orthoses not only as a supporting device which is reducing the aggravating effect of movement during the day (fig. 1), but also as a therapeutic tool, restricted to the night, which is assumingly enhancing the regenerating capacity of organism (fig. 2).

**Habitual overnight immobilization as single therapy significantly improves the clinical symptoms, functionality of hand and life quality of patients with CMC osteoarthritis (J. Hand Surg. (Eur) 42 Suppl. 1. P:191).**



### FOLLOW UP OBSERVATIONS 1,5 - 2 YEARS AFTER FINISHING THE STUDY



- All parameters improved significantly ( $p < 0,05$ ) during the observation period.
- The improvements correlated ( $p < 0,05$ ) with the duration of the treatment period.
- The effect of habitual overnight immobilization persisted in the follow up period (18-24 months), too.

The results strongly suggest to use of immobilising orthoses instead of NSAIDs as primary therapy for thumb osteoarthritis.

### PROPOSED STRATEGY FOR THE FIXATION THERAPY

- Habitual overnight use of the corresponding Chrisofix® Immobilising Orthoses for Saddle Joint osteoarthritis.
- Short-term temporary use of the functional cast-orthosis versions – if necessary – during the day
- Leaving off NSAIDs

# A-0971 Habitually overnight immobilization as a single therapy significantly improves the clinical symptoms, functionality of hand and the life quality of patients with CMC osteoarthritis

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<sup>1</sup> Medical Centre, Hungarian Defence Forces

<sup>2</sup> Chrisofix Ltd

**Objective:** To evaluate the effectiveness of habitual overnight immobilization with a new, POP-like circular stable and re-adjustable orthosis in CMC osteoarthritis.

**Methods:** Twenty-seven patients (36 – 81 years) with symptomatic CMC osteoarthritis (X-ray class II-III) have been involved into this prospective cohort clinical study (in average 6 weeks long). The study period includes 3 assessments (at start, and 3 and 6 weeks later in average). Overnight-use of a POP-like circular stable (immobilizing), well-fitting wrist and saddle joint orthosis was the only allowed therapy. Visual analog scale was used for assessments of pain, physical tasks to check the capability of hand functions (adduction-, sphere grasp-, keeping a bottle at screw stopper- and opening a screw stopper tasks). For assessing changes in the life-quality of the patients quick DASH questionnaire was used and questions were put on occurring of morning stiffness and on set-up of continuous activities-disturbing pain during days. Variance and correlation analysis and non-parametric tests were applied for statistical evaluations.

**Results:** Pain: Nightly occurring pain was reported by 21 patients at beginning and only 4 at end of study (VAS means: 40,2 and 9,9, respectively). Without orthosis (during days), pain in rest and during activities became significantly reduced (VAS score means 35.1 vs. 17.3 and 66.6 vs. 36.7, respectively). Pain-free or improved status has been reported by 8 vs. 25 and 0 vs. 24 patients, respectively. Pain became significantly reduced during all four functional tasks. The statistical analysis of the pooled VAS scores (108 assessments per visit) reflects the time-dependent effects (start, first and second control: 54.1 to 40.0 and 29.0, respectively). Functional tests: The improvement in functional capability of hand functions is clearly reflected in increased number of patients able to perform functional tasks (adduction: 12 to 20, sphere grasp: 13 to 24, bottle grasp at the cup: 11 to 22, and (open a screw stopper of a bottle: 6 to 18).

**Life-quality:** Seventeen patients reported on morning stiffness at start and 7 at end of study. At beginning out of 26, the activity-disturbing pain occurred by 13 patients in the morning, while in 13 cases only afternoon. At end 11 patients did not experience such pain at all, 12 only afternoon and only 2 in the morning.

The quick DASH questionnaire was filled out by 17 patients. All patients declared him- or herself definitely disturbed in the daily activities before start, and only six at the end of study.

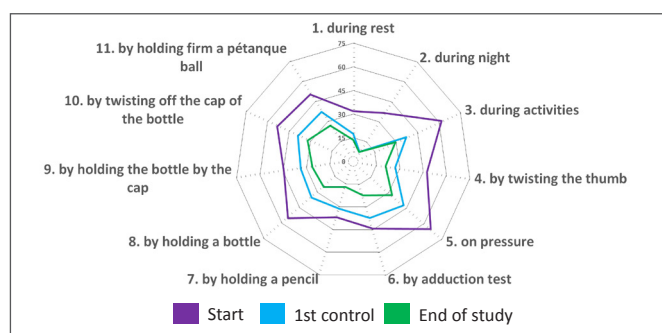
**Conclusion:** Habitual overnight immobilization with POP-like stable circular orthosis without any additional therapy significantly reduced the clinical symptoms, improved the performance in the functional tasks and the life-quality of the patients with CMC osteoarthritis. The effects improved statistically parallel with the duration of the therapy.

## Evidence level: II.

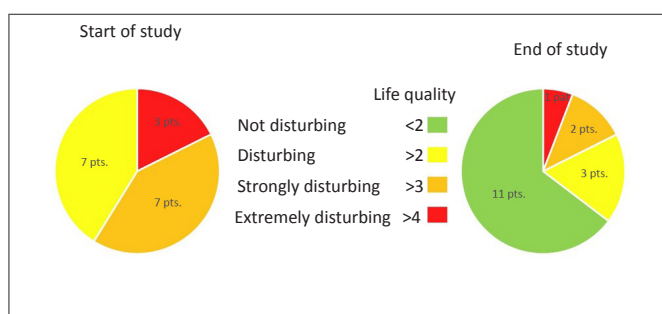
1Chrisofix support restricted to free samples, co-authorship activity only after concluding the statistical analysis.

## Summary graphics from presentation

Changes (mean of 27 pts) in situation-dependent pain severity (VAS%) during the study



Number of patients (17) who assessed the severity of life quality-disturbing factors based on 10 targeted questions



## MORE CHRISOFIX® PRODUCTS

[www.chrisofix.ch](http://www.chrisofix.ch)



IMMOBILISING-ORTHOSIS  
FOR DE QUERVAIN  
SYNDROME



IMMOBILISING-ORTHOSIS  
FOR SPASTIC  
PARESIS



SPLINTS FOR  
BABIES & CHILDREN

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