ProSpon

Lavender Medical

Surgical Technique

Silicone Endoprosthesis of the Finger Joint

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Introduction

Surgical Technique

ProSpon Silicone Finger Joint Endoprosthesis

The ProSpon Silicone Finger Joint Endoprosthesis is manufactured by Medin a.s.

The ProSpon Silicone finger joint replacement has been developed in cooperation with the 1st Orthopaedic Clinic of Charles's University in Prague and is a modification of the original Swanson's design flexible finger joint replacement first developed in 1962.

The implants are intended for the replacement of metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints of the hand.

Implants are provided sterile in seven sizes, designated size 2 to size 8. The instrument set provides trial prosthesis, a canal finder and broach for the preparation of the medullary canal for stem implantation.

The implant is of a monobloc, cementless design with tapered proximal and distal stems which are rectangular in shape and a dorsally offset flexion region. Silastic provides good biocompatibility, durability and excellent flexion characteristics. However, it tears easily when the surface is lacerated, care must therefore be taken with the implantation of the implant to avoid surface damage.

The ProSpon Silicone finger joint prosthesis has excellent wear characteristics and has a long history of follow-up reporting a high degree of patient satisfaction.

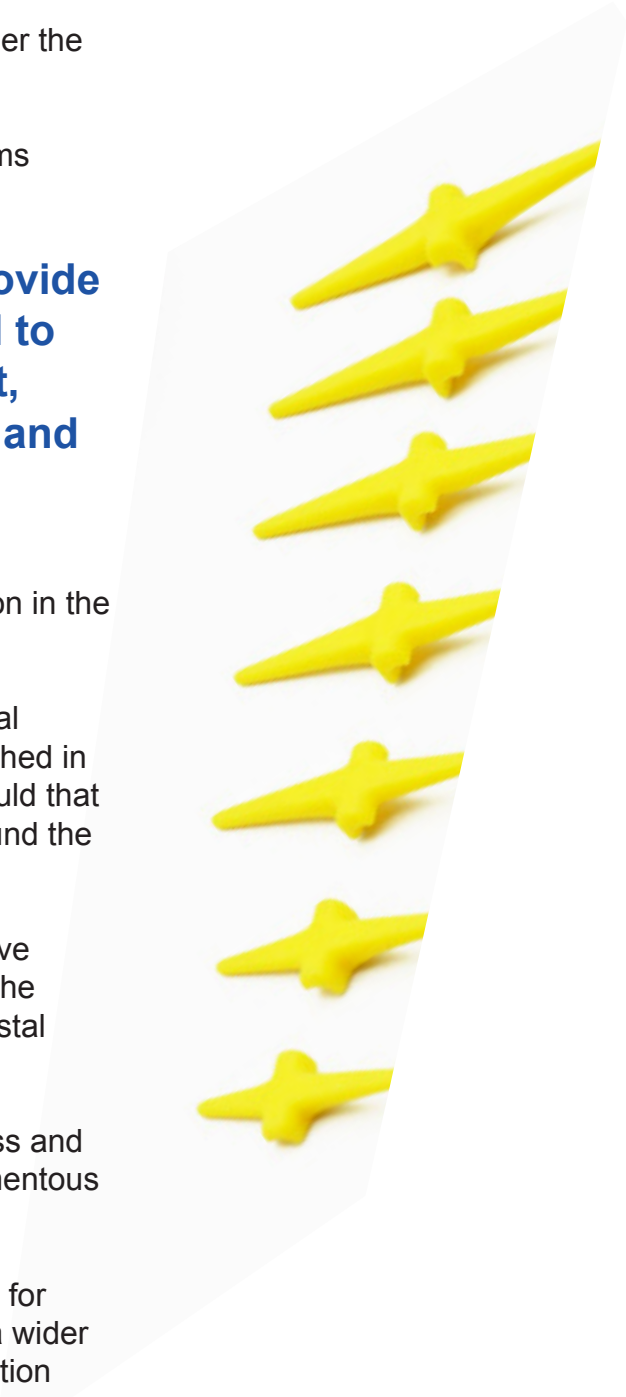
This publication serves as an instruction manual for the implantation of this implant. It is assumed that surgeons who intend to use this implant are familiar with the anatomy and surgical approaches associated with finger joint replacement, in order that this surgical technique may be kept brief.

ProSpon Implant Design

The prosthesis is of cementless monobloc design, with a central bending zone to ensure a near normal range of motion is maintained postoperatively, subject to early mobilisation under the control of a hand therapist.

The rectangular cross-section of the proximal and distal stems prevent the tendency for the prosthesis to rotate.

The central zone has been designed to provide a flexible load distributing hinge designed to maintain proper joint space and alignment, while providing good lateral joint stability and minimal flexion/extension restrictions.



The implant gains stability as the result of a postoperative encapsulation process as first described by Alfred B Swanson in the early 1960's.

The implant acts as a dynamic spacer to maintain the internal alignment and spacing of the reconstructed joint. As established in Swansons original theory the implant acts as an internal mould that supports the capsuloligamentous structures developing around the implant during early mobilisation.

Since the implant is not fixed to bone, the natural compressive loading forces are distributed to the resected bone ends by the central zone of the implant together with the proximal and distal tapered stems which contact the cortical shaft.

The implant becomes stabilised by the encapsulation process and joint stability is achieved from the reconstruction of the ligamentous and musculotendinous structures surrounding the joint.

Since the implant is not fixed to the bone it retains the ability for slight movement which allows better force distribution over a wider area which allows the prosthesis to self-seat in the best position relative to the axis of the joint rotation. This reduces the potential of early implant failure when the forces are within the expected strain tolerance.

Silicone has a very low modulus and is softer than the host bone, it also has force dampening characteristics that further protect the subcondral and cortical shaft areas from overload and possible fractures.

Indications

The implant is intended for the replacement of metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints.

Indications include:

Metacarpophalangeal Joint Arthroplasty

Rheumatoid or post traumatic, osteoarthritis disabilities with:-

Fixed or stiff MCP Joints

X-Ray evidence of joint destruction or subluxation

Ulnar drift that is not correctable by soft tissue procedures alone

Contracted intrinsic and extrinsic musculature and ligament deformities

Associated stiff interphalangeal joints

Proximal Interphalangeal Joint

Rheumatoid or post traumatic, osteoarthritis disabilities with:-

Destroyed or subluxated joints

Stiffened joints in which a soft tissue release alone would be inadequate

Contraindications

Infection

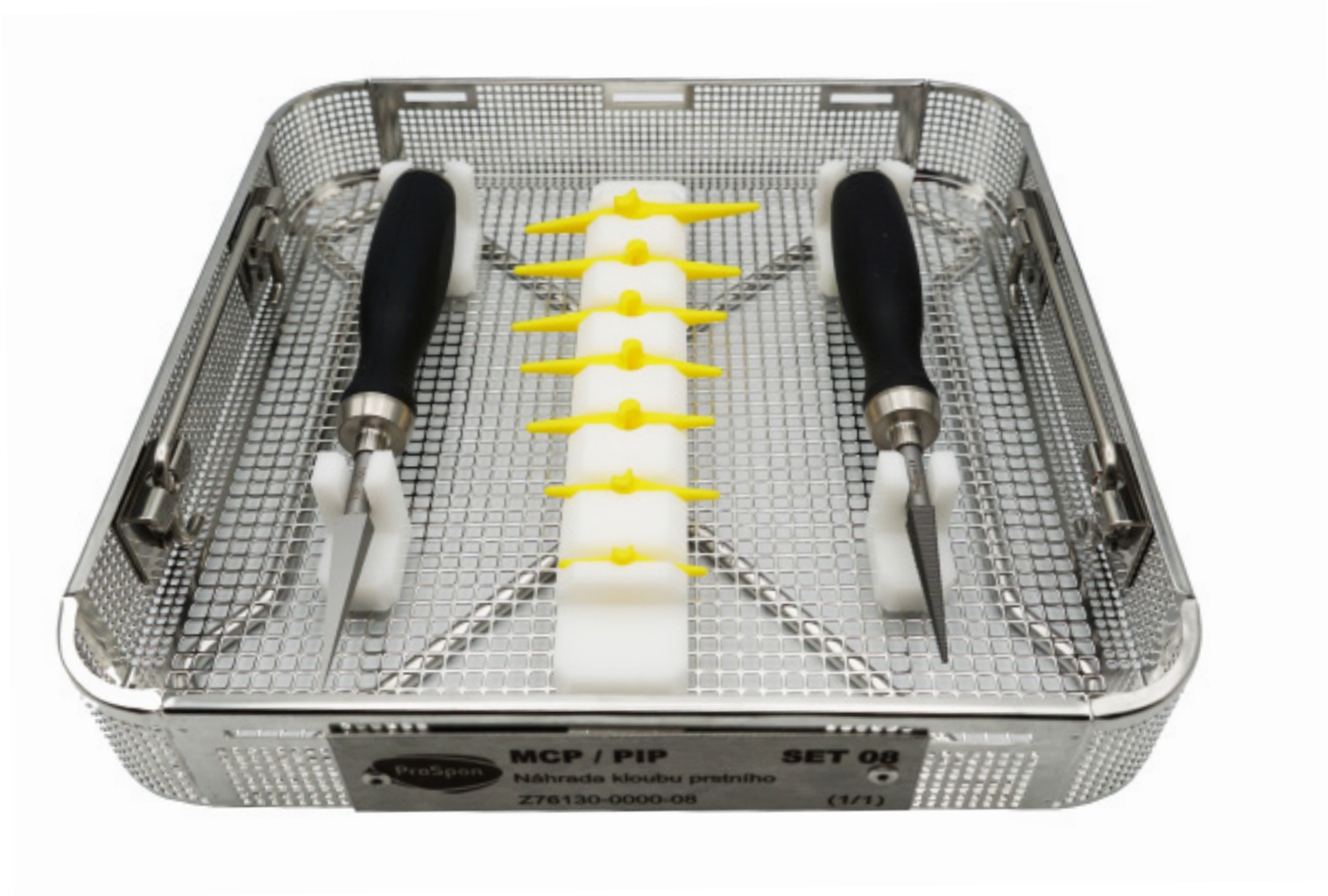
Physiologically or psychologically inadequate patient

Inadequate skin, bone or neurovascular structure

Irreparable tendon system

Immature patients with open epiphysis

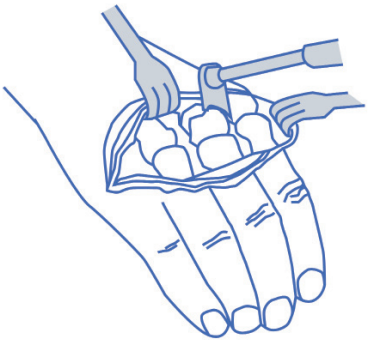
Patients who engage in high levels of physical activity



Surgical Technique Proper

The operation should be conducted in a bloodless field achieved by using a pneumatic tourniquet or Wideawake Local Anaesthetic No Tourniquet (WALANT) technique. An appropriate hand table attachment should be employed.

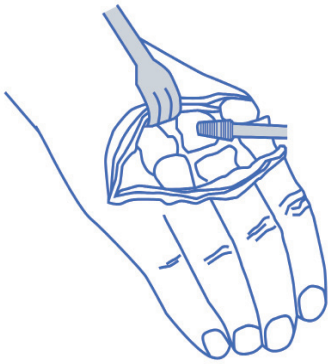
Replacement of the Metacarpophalangeal Joint



A transverse incision is made above the necks of the metacarpal bones on the dorsum of the hand. The dissection is continued down through the subcutaneous tissues to expose the extensor tendons. A longitudinal incision is made above the edge of the extensor tendon in order to open the extensor hood. The metacarpal head is identified.

The neck of the metacarpal is now transected using an oscillating saw leaving part of the metaphysical flare. The metacarpal head is removed together with the synovial membrane. Care must be taken to ensure that the osteotomy is complete in order to avoid splintering the bone. Any residual osteophytes are removed from the metaphyseal flare.

A comprehensive soft tissue release is now performed to allow the base of the proximal phalanx to be mobile enough to be displaced dorsally above the metacarpal. The ulnar collateral ligament is released from its phalange all insertion, if severely contracted it can be excised along with the palmar plate if necessary. The radial collateral ligament insertions are preserved whenever possible.

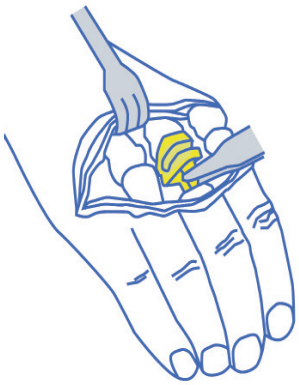


The base of the proximal phalanx is resected including any marginal osteophytes which might interfere with the placement of the implant. All cartilage is removed from the base of the proximal phalanx in order to prevent any recurrent synovitis.

The intramedullary canal in the metacarpal is now prepared using the sharp canal finder to create the initial path for the universal stem broach supplied in the instrument set. Care should be taken to avoid too much reaming of the canals, especially in patients with thin or osteoporotic bone.

Occasionally, the creation of a medullary canal may prove to be difficult in which case a small burr may be employed to assist in the process.

Once a medullary canal has been established in the metacarpal the process is repeated to create a medullary canal within the proximal phalanx using the sharp canal finder and the universal stem broach.



In order to select the appropriate definitative implant, trials are used to ascertain the most appropriate size. A trial reduction is conducted placing the metacarpal stem first. In order to place the phalangeal stem distraction and flexion will be required to create the space to allow the stem into the phalanx.

Care should be taken to ensure that the trial implant is a good fit, particularly with the digit in full extension. The implant stems should fit well within their respective canals to ensure that the transverse midsection of the implant has a good approximation with the bone ends. The end of the implant stems must not abut the end of the intramedullary canal. If this occurs the stem must be appropriately shortened. Care must be taken not to under or over size the implant, ensuring that the largest implant possible is used.

When implanting the definantive implant care must be taken to avoid surface damage to the implant that may result in early failure.

Replacement of the Interphalangeal Joint

A “C” shaped incision is made over the dorsum of the joint so that the skin sutures do not lie directly over the tendon repair. In the little and index fingers, the incision is made away from the presenting surface and the dorsal veins are respected.

If associated flexor tendon surgery is also indicated, a mid- lateral incision or planar incision is used. This allows accessibility to both the joint and the tendon.

The extensor mechanism is exposed by sharp and blunt dissection, avoiding injury to its surface. The central tendon is identified and incised longitudinally in a proximal fashion from its insertion at the base of the middle phalanx through the distal two-thirds of the proximal phalanx.

Adequate release of the joint is mandatory to ensure adequate exposure for canal preparation.

If the joint is severely contracted, it may be released by removing bone from the proximal and middle phalanges. However, it may be necessary to to incise the palmar plate and collateral ligaments either proximally or distally according to where more bone needs to be removed. When incised the collateral ligaments should be reattached with a 4.0 nylon suture passed through a small drill hole made in the dorsal lateral aspect of the neck of the proximal phalanx and/or middle phalanx. The sutures should be placed before implant implantation to avoid damage to the definitive implant.

The head of the proximal phalanx is resected at the metaphyseal flare using an oscillating saw. The intramedullary canal is prepared using the sharp canal finder and the universal stem broach in order to receive the implant stem. A burr may be used in cases where the the broach proves ineffective but care must be taken in thin or soft bone.

The base of the middle phalanx and intramedullary canal are prepared in a similar fashion. Care is taken to ensure that al cartilage is removed in order to avoid subsequent recurrent synovitis.

Once the bone ends and medullary canals have been prepared a trial reduction is conducted using the largest acceptable trial implant. The midsection of the implant should fit well against the bone ends. Care should be taken to ensure that the stems do not abut the end of the medullary canal. The stems on the definantive implant may be shortened if necessary to ensure a perfect fit.

The implant should remain stable in both flexion and extension. If this is not the case, consideration should be given to either conducting a further soft tissue release or a further resection of bone.

Swan Neck Deformity

In Swan Neck deformity with the combined involvement of the metacarpophalangeal and Proximal Interphalangeal Joints, both joints are treated at the same time. Hyperextension of the Proximal Interphalangeal Joint is corrected through a readjustment of the joint system. The tight central tendon is lengthened by means of a Z-Plasty and the lateral bands are relocated palmarward.

Boutonniere Deformity

Where a boutonnière deformity exists, the central tendon has usually been lengthened and the lateral tendons displaced palmarward with the connecting fibres stretches out. The stretched out attachment of the central tendon is sutured with a 4.0 nylon, suturing their connecting fibres or over-lapping any redundant fibres. A residual hyperextension deformity of the distal joint can be corrected by lengthening or sectioning the lateral tendons over the middle phalanx distal to the triangular ligament.

Manufacturer & Distributor Details

The manufacturer of this device does not practice medicine and does not recommend this or any other surgical technique for use on a specific patient. The surgeon who performs any implant procedure is responsible for determining and using the appropriate techniques for implanting the device in each patient.

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