The South African Society for Surgery of the Hand

Refresher Course

Normal and Abnormal Digital Balance

with special reference to Rheumatoid Arthritis

21-22 April 1996

Bloemfontein

WELCOME

Dear Participant

Functional anatomy of the hand is essential to enable logical examination, to come to a rational diagnosis and to offer a reasonable management.

Practical function of the hand depends on well synchronised digital balance.

This we will be discussed and debated at the 1996 Refresher Course in Bloemfontein. Hope you will be part of this deliberation.

See you there!

ULRICH MENNEN
PRESIDENT: SASSH

Dear Delegate

Welcome to the City of Roses in the year of our 150th anniversary. The theme of this year's Refresher Course is digital balance and the place of small joint arthroplasty.

I am sure the debate will be lively and contribute to our understanding of the complexities of the pathology at hand.

My heartfelt thanks to the colleagues whom have given of their time and expertise to present talks.

May you, during your stay, experience some of the *gasvryheid* that is unique to Bloemfontein.

EVERT VISSER
ORGANISER: SASSH REFRESHER COURSE 1996

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SCIENTIFIC PROGRAMME

SUNDAY 21 APRIL 1996

07:30-08:15	Registration/Registrasie	
08:15-08:30	Welcome and Announcements by President and Course Organiser/Verwelkoming en Aankondigings deur President en Kursusorganiseerder	

CHAIRMAN/VOORSITTER DR LT (WIKUS) DE JAGER

08:30-09:30	The Normal and Pathological Functional Anatomy of Digital Balance	***Prof U Mennen***
09:30-10:00	Discussion	
10:00-10:20	Rehabilitation of swan-neck and Boutonnière deformities	***Ms C van Velze***
10:20-10:30	Discussion	
10:30-11:00	**TEA**	

CHAIRMAN/VOORSITTER-PROF KS NAIDOO

11:00-11:20	Camptodactyly	***Dr LT de Jager***
11:20-11:30	Discussion	
11:30-11:50	Concepts in Flexible Implant Arthroplasty	***Prof NGJ Maritz***
11:50-12:00	Discussion	
12:00-12:40	Surgical Staging of Rheumatoid Arthritis	***Dr JH Fleming***
12:40-13:00	Discussion	
13:00-14:00	**LUNCH/MIDDAGETE**	

CHAIRMAN/VOORSITTER DR SL BIDDULPH

14:00-15:00	X-ray Discussion led by Chairman	
15:00-15:20	Thumb-in-Palm Deformity	***Dr A Matime***
15:20-15:30	Discussion	
15:30-16:00	**TEA/TEE**	

CHAIRMAN/VOORSITTER DR F LIEBENBERG

16:00-16:20	Balance of the Thumb	***Dr SL Biddulph***
16:20-16:30	Discussion	
16:30-16:50	Imbalance of the Thumb	***Dr SL Biddulph***
16:50-17:00	Discussion	
17:00-late	**SOCIAL FUNCTION/SOSIALE FUNKSIE**	

1. Boetie Ticaret
2. Niel v. Coden
3. Neels Rossouw
4. Wim Liebenthal
5. Gerhard Kolan

Theo le Roux
Archie Makunie
Evert Uitzet
Prof Maritz

MONDAY/MAANDAG 22 APRIL 1996

CHAIRMAN/VOORSITTER DR JH FLEMING

08:30-08:50	Rehabilitation after Digital Arthroplasty and Arthroplasty at the Base of the Thumb	***Ms C van Velze***
08:50-09:00	Discussion	
09:00-09:20	Wrist Biomechanics	***Dr F Liebenberg***
09:20-09:30	Discussion	
09:30-09:50	Wrist Examination	***Prof KS Naidoo***
09:50-10:00	Discussion	
10:00-10:20	Tendon Ruptures in Rheumatoid Arthritis	***Dr D Rodseth***
10:20-10:30	Discussion	
10:30-11:00	**TEA/TEE**	

Blatt — ? wicks
Cisyng — what do.

CHAIRMAN/VOORSITTER PROF U MENNEN

11:00-11:20	Carpal Bones: Scapholunate Pathology	***Dr T le Roux***
11:20-11:30	Discussion	
11:30-11:50	The Wrist in Rheumatoid Arthritis	***Dr D Rodseth***
11:50-12:00	Discussion	
12:00-12:30	X-ray Discussion led by Chairman	
12:30-12:50	Silicone Sinovitis ? same as pros	***Prof KS Naidoo***
12:50-13:00	Discussion	
13:00-13:15	Closure by the President	
13:15	**LUNCH/MIDDAGETE**	

Can do it ourselves — high quality much information

1. Exco members meet
2. SASSH/ ! strike a balance.
   0. relevant
   3. participation by all members — your society
   4. sponsors / members / ideas
3. Those who proceed to next RC. — enjoy.

1. Mr. Hartgerink
2. Evert Uitzet
3. Hendrika and Menne
4. Projection etc.
5. Trade
6. you & the participants

THE NORMAL AND PATHOLOGICAL FUNCTIONAL ANATOMY OF DIGITAL BALANCE

PROF ULRICH MENNEN

OUTLINE OF PRESENTATION

The following factors maintain normal and smooth digital balance:

1. An anatomical integrity of the extensor apparatus with the various tendons, check rein mechanisms and ligaments
2. Stability and integrity of digital joints
3. Balance between extrinsic tendons (i.e. flexors and extensors) and intrinsic muscles (i.e. lumbricals and interosseous)

The anatomy and the interrelationship between the various structures will be demonstrated and explained.

Any disturbances of the smooth digital balance mechanism will result in malfunction resulting in typical deformities, i.e. Boutonnière deformity, swan-neck deformity and mallet deformity.

The pathological anatomy and the effect of these lesions will be demonstrated.

Correcting these deformities calls for a thorough understanding of the anatomy and pathology. The management options will be discussed.

During the discussion time, certain aspects may be highlighted and additional information will be welcomed from the floor.

RECOMMENDED READING

Chapter 3: Functional Anatomy - Normal and abnormal digital balance in "The Hand Book - A practical approach to common hand problems". Editor: Mennen U. JL van Schaik Publisher, Pretoria - 2nd Edition 1994.

REHABILITATION OF SWAN-NECK AND BOUTONNIERE DEFORMITIES

MS CORRIANNE VAN VELZE

A **swan-neck deformity** is a combination of PIP hyperextension and DIP flexion. This deformity may be as a result of rheumatoid arthritis where it is caused by tight interossei which pull on the extensor tendons in an abnormal manner. This in turn, causes hyperextension of the hyper mobile PIP joints. Early detection of tightness of the intrinsics will enable the therapist to prescribe specific exercises to lengthen the intrinsics. A splint which should be worn at night, can also assist in obtaining length. However, once the deformity exists, an attempt should be made to reverse the deformity by splinting the PIP joint in flexion of approximately 30°. This little splint should be worn during the day when the hand is used and a dynamic PIP flexion splint should be worn at night.

A swan-neck deformity may also be the result of an untreated PIP joint hyperextension injury. In this case the deformity occurs from damage to the volar plate, collateral- and retinacular ligaments. Surgery is indicated to correct this deformity and post-surgery the PIP joint is held in 25-30° flexion for about 3 weeks to allow soft tissue healing to take place. Thereafter, gentle active flexion and extension of the joint is commenced. It is advisable that a PIP flexion splint is worn at night for a further 8 weeks.

A **Boutonnière deformity** consists of flexion of the PIP joint and hyperextension of the DIP joint, caused by the PIP joint slipping up between the lateral bands of the EDC, which then act to flex the PIP joint and (hyper) extend the DIP joint. This deformity may be caused by rheumatoid arthritis or by traumatic injuries, such as when the finger is struck by a ball.

Treatment depends on the severity of the deformity. In the acute phase, when passive extension of the PIP joint is still present, the joint is simply splinted in extension, the distal joint is left free. This allows DIP flexion which in turn will prevent adherence of the lateral bands and contracture of the retinacular ligament. After a couple of days dynamic splinting can be instituted.

Sadly many patients only seek help once a fixed deformity has developed. In this case, passive PIP extension is not possible due to shortening of the lateral bands. Passive PIP extension should be obtained first. This can be achieved by serial splinting with plaster of Paris or by using dynamic PIP extension splint (light resistance over a long period of time). Once full passive PIP extension has been achieved, a dynamic splint is supplied which keeps the joint in extension, but allows gently active flexion. Splinting should be maintained for at least 6 - 8 weeks.

CAMPTODACTYLY
DR WIKUS DE JAGER

DEFINITION

Camptodactyly is a developmental flexion contracture of the PIP joint unrelated to trauma, systemic disease or neurologic abnormality.

INCIDENCE

1% of the general population, most Caucasian
5% of congenital hand anomalies
It occurs mostly sporadically, but when it is familial, it is an autosomal dominant condition

CLINICAL PRESENTATION

Camptodactyly presents in 2 distinct age groups, namely infants and adolescents. Most cases occur in infants when both males and females are affected equally, but the adolescent group consists mostly of females.

Typically the little finger is affected, bilateral in two thirds of cases. Occasionally the ring finger and rarely the middle finger may also be involved. The MP joints and DIP joints are normal. The PIP joint flexion deformity varies from 20° to 100°. The patient compensates by hyperextension of the MP joint.

Secondary contracture of the volar plate and/or accessory collateral ligaments must be excluded by flexing the wrist and MP joints and assessing passive PIP joint extension. An anomalous lumbrical should be suspected if full PIP joint extension is possible when the MP joint is flexed with wrist positioning not influencing PIP position. A shortened FDS is present if wrist flexion alone overcomes the PIP joint flexion.

X-RAYS

In longstanding cases secondary changes are visible on the lateral view:

1. Flattened proximal phalanx condyles
2. Notch in the proximal phalanx neck
3. PIP joint space narrowing

DIFFERENTIAL DIAGNOSIS

1. Traumatic Boutonnière deformity
2. Dupuytren's disease
3. Arthrogryphosis
4. Clinodactily, a congenital radial-ulnar deviation at the PIP joint
5. Extensor hypoplasia

ANATOMICAL CAUSE

1. Abnormal lumbrical, inserting into the MP joint FDS tendon or flexor sheath
2. Shortened FDS
3. Deficient central extensor slip

SECONDARY CHANGES

1. Accessory collateral ligament contracture
2. Palmar plate contracture
3. Bony changes

TREATMENT

Management is controversial. It is important to keep the following principles in mind:

1. The patient's complaint is usually cosmetic rather than functional
2. The outcome of surgery is unpredictable
3. Loss of flexion interferes more with function than the loss of extension

Surgery is therefore best avoided unless the deformity is severe and interferes with the patient's function.

SPLINTING

Splinting is used pre-operatively to overcome fixed flexion deformities of the PIP joint and is continued post-operatively for 3-6 months. Long-term splinting in small children can be effective, but interferes with function and may cause DIP joint hyperextension if incorrectly applied.

SURGERY

1. <u>Soft tissue release and tendon transfer</u>

   Surgical correction is performed through a volar Bruner incision or a longitudinal incision with Z-plasties. The abnormal lumbrical insertion is released and transferred to the lateral bands. FDS may also require release. Occasionally the accessory collateral ligament and even volar plate may require release. FDS may be transferred to the lateral band and central slip via the lumbrical canal.

   A K-wire is passed through the PIP joint in extension and removed after 3 weeks. A static PIP joint night extension splint is continued for 3-6 months.

2. Osteotomy

Proximal phalanx neck corrective osteotomy is reserved for adult patients who have a severe contracture with PIP joint bony changes. It limits flexion.

RECOMMENDED READING

1. RJ Smith in: The Practice of Hand Surgery, edited by DW Lamb, G Hooper and K Kuczynski. Second Edition, 1989.
2. VE Wood in: Green's Operative Hand Surgery.
3. J Upton in: McCarthy's Plastic Surgery. First Edition, 1990.
4. McFarlane RM, Classen DA, Porte AM and Botz JS. The anatomy and treatment of camptodactyly of the small finger. J of Hand Surgery 1992 17A; 1:35-44.
5. Miura T, Nakamura R and Tamura Y. Long standing extended dynamic splintage and release of an abnormal restraining structure in camptodactyly. J of Hand Surgery 1992 17B; 6:665-672.

CONCEPTS IN FLEXIBLE IMPLANT ARTHROPLASTY
PROF NGJ MARITZ

Not available at time of printing.

SURGICAL STAGING OF RHEUMATOID ARTHRITIS
DR JOHN FLEMING

In today's world where rheumatoid arthritis is treated by very powerful drugs, the old crippled and deformed victims of this disease are less common. Nonetheless, it does affect both upper- and lower limbs and in general principle it is wiser to correct the problems in the lower limbs before reconstructing the upper limbs.

When dealing with the upper limb, it is normal to do multiple surgical procedures at once in order to shorten the patient's surgical saga. If it is appropriate, I would start at the top and move down towards the finger tips. In the forearm the important maxim is to do the worst first and to reconstruct the wrist before the fingers. The wrist is the key to the hand and rebalancing the extensor tendons is a vital part of this. Thus reconstruction of the distal radial ulnar joint with or without reconstruction of the wrist is then followed by a dorsal synovectomy and a transfer of ECRB to ECU. This has 2 benefits: It corrects the slackness of the radius and aligns the extensor tendons to the fingers correctly. At a second stage the ulnar drift of the MP joints is corrected together with fusions of the MP joint of the thumb and the DIP joint of the fingers. I will do the PIP joints last if they are involved at the same time as the MP joints.

THUMB-IN-PALM DEFORMITY

DR AM MATIME

Thumb-in-palm deformity is an infrequent condition that presents mainly in childhood. The deformity causes a major functional loss because of the importance of the need for the ability to position the thumb in opposition and abduction. When it does present, the surgeon needs to diagnose the type of deformity and plan corrective surgery appropriately.

This paper aims to look at some of the causes of this deformity and some of the methods available for treatment, based on some patients treated in our unit.

BALANCE OF THE THUMB
DR SYDNEY L BIDDULPH

Balance of the thumb depends on stability and movement.

Stability depends on joint integrity.

Movement depends on musculo-tendinous integrity.

JOINTS

1. Carpometacarpal joint

   This joint is to the thumb what the wrist joint is to the hand - its foundation. Basically a saddle joint, it allows multidirectional movement so essential for opposition. The treater the mobility, the greater is the risk of instability. Hyperlaxity, trauma and arthritis are common causes of instability at this level.

2. Metacarpophalangeal joint

   Although this joint is described as a hinged joint, significant abduction, adduction and rotation occur at this level.

3. Interphalangeal joint

   Only flexion and extension with minimal rotation occur at this joint.

   Movement at these joints are controlled by extrinsic and intrinsic muscle groups.

   Co-ordinated action between these groups allow controlled opposition which consist of abduction, flexion, extension and rotation at the various joints.

   Loss of function of any of these muscles, singly or in groups, will result in a particular type of imbalance.

IMBALANCE OF THE THUMB

CAUSES OF IMBALANCE

Congenital

Acquired
- Trauma
- Arthritis
- Neurogenic

Above may result in the following anatomical disturbances:

1.	Joint instability	(a) Capsular (b) Ligamentous (c) Fracture dislocation
2.	Musculo-tendinous lesion	(a) Extrinsic lesions (b) Intrinsic lesions
3.	Neurological control	(a) Median nerve injuries (b) Ulnar nerve injuries (c) Combination

The above lesions may result in certain classical deformities of which the most common are:

1. Swan-neck deformities due to instability of the first carpometacarpal joint
2. Boutonnière deformities due to loss of extensor power at the MP joint
3. Gamekeeper's thumb due to a torn ulnar collateral ligament of the MP joint
4. Mallet finger deformity due to rupture of EPL at the IP joint
5. Dropped thumb due to rupture of EPL at the wrist

Treatment consist of restoring competency of the ligaments and of musculo-tendinous lesions.

With total destruction of joints, fusions or arthroplasties may be indicated.

REHABILITATION AFTER DIGITAL ARTHROPLASTY AND ARTHROPLASTY AT THE BASE OF THE THUMB

MS CORRIANNE VAN VELZE

After digital arthroplasty the greatest challenge in post-operative rehabilitation is to maintain a proper balance between healing of the surrounding scar tissue and at the same time apply enough tension on the scar to obtain the desired range of motion of the joint. This is usually done as follows:

After surgery the hand is placed in a fully supportive light weight plaster splint until post-operative swelling has decreased. A dynamic finger (either MP or PIP, depending on the involved joint) extension splint is applied over a lightly padded dressing. The tension of the rubber bands should be tight enough to support the finger in extension but loose enough to allow 70° of joint flexion.

This splint is worn during the day and a full resting splint is worn at night for approximately 4 weeks. Gradually active flexion and extension exercises of the joint are introduced and the patient is encouraged to use the hand in everyday activities with light resistance, such as dressing and eating.

After arthroplasty of the base of the thumb, the thumb is held in a position of palmar abduction and opposition for 3-4 weeks to ensure good capsular healing. Thereafter the patient starts opposition, abduction and circumduction exercises a few times a day, but continues to wear the splint. Gradually, dexterity activities are added to the programme and at about 8 weeks post-surgery, activities to strengthen the thumb are introduced.

Since many patients who have had arthroplasty surgery suffer from rheumatoid arthritis, the principles of joint protection are stressed throughout their rehabilitation.

WRIST BIOMECHANICS

DR F LIEBENBERG

Mechanically the wrist joint is the most complex joint in the body.

Functionally it transmits forces through the hand to the forearm and also acts in a kinematic linkage system as the final adjuster of the hand in space.

The status of the wrist joint thus determines the functional ability of the hand. This is especially evident in the rheumatoid hand.

Many authors have studied the wrist kinematics and different models have been advised. This varies from Gilford's (1943) link joint to the present ring concept with its variations.

A short discussion of these models with its clinical applications will be given.

WRIST EXAMINATION
PROF KS NAIDOO

The wrist is often called the "low back" of hand surgery. Successful examination of the wrist requires the following:

- Thorough knowledge of the anatomy and biomechanics
- Careful history
- Sound clinical examination
- Awareness of the causes of wrist pain

This is supplemented by the appropriate special investigations.

CLINICAL HISTORY

This must include a history of the local (wrist) problem and a systematic general medical history.

Essentially one must find out if the problem is injury related or of spontaneous onset.

Be aware of:

- mechanism of injury
- unrecognised trauma
- work related factors
- sports or hobbies

Note:

- Pain: acute/chronic localise accurately
- Swelling
- Clicks, cluncks, snaps, subluxations, triggering, crepitus
- Limitation of movement
- Neurological symptoms
- Vascular complaints

PHYSICAL EXAMINATION

- Patient must be relaxed and made comfortable
- Begin your examination of the whole patient, rest of upper limb or wrist as is necessary
- The examination is carried out in the usual systematic manner: inspection, palpation and movement
- Whenever possible, the patient should demonstrate the movement or position that produces the discomfort. Careful inspection and palpation may localise the site and source of pain, clicks or cluncks

- Examine the wrist in zones - dorsal and volar

  - Dorsal zones: Radial, Central, Ulnar
  - Volar zones: Radial, Central, Ulnar

- Examine both soft tissue and bone and joint structures cf the zones
- Neurovascular examination must be performed as completely as is indicated

LOCAL INJECTIONS

Local injections of specific structures with short acting local anaesthetics may be performed to localise the site and source of discomfort.

LIST OF SOME CAUSES OF WRIST DISORDERS

Congenital	Radial club hand Madelung's deformity
Trauma	Fractures Non-union Carpal instability SLAC wrist Distal radioulnar joint
Infection	Acute Chronic NB! Gonococcal TB
Inflammatory	e.g. Rheumatoid Arthritis (RA)
Nerve Syndromes	Carpal Tunnel Guyon's Tunnel Post Interosseous Neuralgia
Tendor Disorders	Tendinitis Stenosing tenosynovitis Subluxations/dislocations Ruptures
Ganglia	Extraosseous Intraosseous
Degenerative	O.A. localised Generalised

THE WRIST IN RHEUMATOID ARTHRITIS
DR DAVE RODSETH

The wrist is the keystone to the hand.

Failure to address the problems of RA in the wrist will result in loss of finger function.

The natural history of the RA wrist and the more common surgical procedures will be discussed.

SILICONE SYNOVITIS
PROF KS NAIDOO

A survey of the literature confirms that foreigh body giant cell synovitis and focal bony destruction does occur with silicone implants. This is called silicone synovitis.

The incidence is greater in the radiocarpal and carpal bone replacements than in finger joint replacements. This is due to the increased compressive loading and shearing that occurs at wrist level than in the fingers.

The mechanism for production of this synovitis is probably related to the crystals. There is ingestion of the debris and deposition in the synovial tissue. Because the material is non-digestible, there is giant cell formation with release of chemical mediators, cellular infiltration and lining cell hyperplasia. This leads to resorption, loosening and failure.

The onset of the radiographic changes produced by silicone synovitis is not time related. It may occur within 2 years of surgery or take longer.

All patients with radiographic changes of silicone synovitis are not necessarily symptomatic.

Revision surgery is necessary for symptomatic patients. This includes debridement, removal of implant and reconstructive procedures.

ADDRESS LIST OF SPEAKERS

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ACKNOWLEDGEMENTS

We are grateful to **FIRST NATIONAL BANK** for their sponsorship of the stationery.

Neoplasms	Bone cysts Enchondroma Osteoid osteoma Metastasis
Kienböck's Disease	
Miscellaneous	e.g. Impingement - Radial - Ulnar

TENDON RUPTURES IN RHEUMATOID ARTHRITIS
DR DAVE RODSETH

This is a common complication of rheumatoid arthritis in the hand, but the diagnosis can be missed for a number of reasons.

Preservation of function in the RA hand is essential and it is therefore important that these ruptures are:

1. Prevented where possible
2. Diagnosed as soon as possible
3. Treated optimally

The more common ruptures will be discussed.

CARPAL BONES: SCAPHOLUNATE PATHOLOGY
DR THEO LE ROUX

Scapholunate dissociation (rotatory subluxation of the scaphoid) is the most frequent form of carpal instability (Taleisnik). Pathology of this area is still difficult to recognise and the management also very controversial.

- This talk will cover the classification used by Watson et al for rotatory subluxation of the scaphoid
- The different treatment modalities (closed reduction to surgery)
- Several surgical techniques from soft tissue procedures to wrist arthrodesis
- Results from different surgeons and
- Complications after the different treatment modalities

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