

# The Rheumatoid Hand

## The Rheumatoid Hand

Hand Therapy Training  
Programme

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Acknowledging Julie Collis

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# Outline

- Arthropathies
  - Gout, Lupus, Psoriatic Arthritis
  - Rheumatoid Arthritis
- Advances in RA drug therapy
- Hand Therapy
  - joint protection, exercise & splinting
  - outcome measures
- The wrist
- MCPJs
- IPJs
- The thumb

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# Arthropathies

- Rheumatoid Arthritis
- Crystal induced arthropathies (Gout)
- Systemic lupus erythematosus (SLE or lupus)
- Psoriatic Arthritis
- Osteoarthritis
- Childhood Arthritis (Juvenile Arthritis)
- Septic Arthritis
- Connective tissue rheumatic diseases (Scleroderma)
- Spondyloarthropathies (Reactive & Ankylosing spondylitis)

### Risk factors

- Obesity, hypertension, alcohol
- Diet rich in meat and seafood
- 20 - 30 / 100,000
- 0.13 - 0.37 % of population
- Male : Female 20:1

### Acute Attack

- Sudden, excruciating joint pain
- Inflamed joints
- May follow trauma, surgery, drugs, exercise or alcohol
- Commonly affects MTPJ of great toe
- 7% never have a second attack

### Chronic Gout

- Recurrent attacks → poly-articular
- Deforming arthritis
- Tophi in cooler areas of body; elbows, ears, distal finger joints
- Tophaceous gout – can ulcerate through the skin
- Stiff extended fingers



## Gout

Metabolic disorder / Crystal arthritis

- overproduction of purines (found in some foods and human tissue) results in hyperuricaemia
- deposition of uric acid crystals in body tissues

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- Predominantly affects women in childbearing years
- Female:male, 9:1
- Unknown aetiology
- Relapsing-remitting course
- Clinical features: fatigue, rash, musosal ulcers, inflammatory polyarthritis, photosensitivity, serositis
  
- Features of arthritis
  - Nonerosive
  - Joints remain reducible
  - Varies from mild joint pain to deformities
  - Usually symmetric
  - Predominantly affects knees, wrists, small joints of the hands
  - Deformities similar to RA but without erosions



*Typical SLE radiographs. Note joint dislocations without erosive changes or joint space narrowing*

## Systemic lupus erythematosus (SLE or lupus)

Autoimmune disease:

- Production of antibodies to body cells
- widespread inflammation and tissue damage
- mainly affects joints & kidneys

- Psoriasis precedes onset in 60-80% of patients
- 5% of patients with psoriasis develop arthritis
- musculoskeletal symptoms usually insidious in onset
  
- Features of arthritis
  - spondyloarthritis
  - asymmetric oligoarthritis (1-4 joints)
  - symmetric polyarthritis
  - DIP arthropathy
  - arthritis mutilans
  - dactylitis with sausage digits in 35% of patients



## Psoriatic Arthritis

- Seronegative spondyloarthropathy found in patients with psoriasis
- characteristic features of DIP involvement and arthritis mutilans

- Occurs in 0.5% - 1% of the population
- Twice as often in women
- 45-65 yrs
- Hands & wrists affected in 80% -90%
- Can affect any synovial joint
- Radiographic erosion typically fastest in first year of disease
- Primarily affects joint synovium
- Joint pain, stiffness, loss of ROM, grip strength, disability, fatigue



## Rheumatoid Arthritis

Auto-immune disease  
Systemic, progressive,  
inflammatory arthritis  
Usually seropositive (RF)

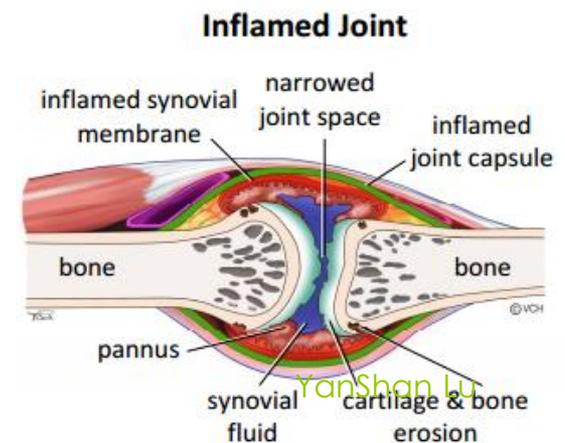
## RA *pathomechanics*

- Synovitis → painful, swollen joints
- Hypertrophic synovium (pannus) invades cartilage and bone
- → capsular distention, ligament laxity, destruction of cartilage, subchondral bone erosion, muscle imbalance, loss of ROM

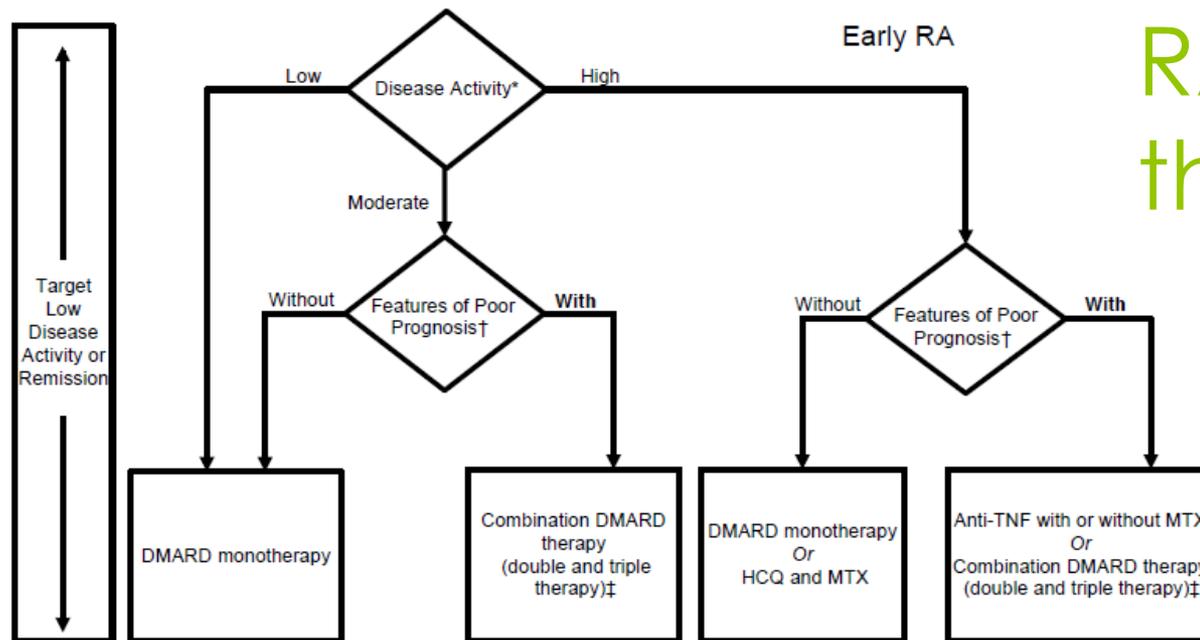
combined with external forces on joints



joint disorganization / deformity



- NSAIDs
- DMARDs (methotrexate, leflunomide, hydroxychloroquine, sulfasalazine)
- biologic DMARDs (Non-TNF: abatacept, rituximab) Anti-TNF infliximab, etanercept, adalimumab)
- historically, Rx progressed from corticosteroids/NSAIDs to DMARDs) and finally bDMARDs
- more aggressive treatment approach now advocated
- Biological agents have revolutionised management of rheumatic diseases
- Biologics are genetically engineered proteins derived from human genes. They are designed to inhibit specific components of the immune system



# RA drug therapy

# Hand Therapy

- Increase function / independence
- Prevent/delay joint deformity
- Maintain joint ROM, stability and muscle strength
- Reduce pain
- Promote self management of disease
  
- Treatment Modalities
  - Education
  - Joint protection
  - Splinting
  - Exercise
  - Equipment / compensatory approaches
  - Heat
  - Coping strategies

# Efficacy of nonsurgical or drug interventions for RA (Christie, 2007)

Intervention	Results	Quality of Evidence
Advice about assistive devices	Unclear	Low
Joint protection	Improves function, no difference in pain	High
Splints	Unclear	Low
Education	Improves function and patient global ax	High
Exercise	Reduces pain, improves function, no difference in patient global ax	Low
Ultrasound	Reduces pain, improves function	Low
Thermotherapy	Unclear	Low

# Joint protection, splints, exercise EBM

## Joint protection

- improves function, (Christie, 2007)
- 2007 RCT: less pain and disability in experimental group (Maiero et al)

## Splints

- some indication for splints reducing pain, increasing grip strength, –ve effect on dexterity (Christie, 2007)
- 2008 (Veehof et al) RCT: wrist splints significantly decrease wrist pain
- Insufficient evidence for efficacy of finger splints (Vlieland, 2011)

## Exercise

- O'Brien et al (2006) RCT: JP+ strengthening + AROM / JP + AROM / JP
  - Statistically sig. difference in UL function and key pinch
- Vlieland (2007) review
  - No x-ray progression of hand deformity with resistance training
  - 2 yr exercise program: improved ms strength, function, bone density



# Joint Protection

- Respect pain
- Pace your activities / balance work & rest
- Choose strongest joints available
- Use good body mechanics
- Avoid positions of deformity (pressure against backs of fingers, lateral pinch grip, tight grip)
- Use adapted equipment
- maintain muscle strength and joint motion

# Exercise

- average female RA pt has 21% grip strength of non RA female
- traditionally thought to cause damage and inflammation unless very gentle
- recent evidence in favour of strengthening
- studies show benefits from aerobic exercise and strengthening without further damaging joints
- improved strength and function following 6 week hand strengthening programme (Pereira, 2012)

Patients can be taught strengthening programs that include both the flexor and extensor musculature. Strengthening can include typical therapy products including putty, grip tools, clothespins, theraband, elastics and weights. Strengthening can also be achieved for little to no cost with products commonly available in a patient's home. A patient can be told to fill an uninflated balloon with flour or sand to use for grip strengthening. They can make their own putty by combining Borax with white household glue, such as Elmer's. Clothespins can be used for pinch. An elastic may be wrapped around the end of the clothespin to provide more resistance. Elastics may be used for finger and thumb extensor strengthening. For wrist extensor and flexor strengthening, a patient can use a roll of coins, a narrow bottle or can, or fill a tote bag to the desired weight.



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# Splinting

- Review with respect to specific deformity
- From my experience
  - challenging
  - often better in theory than practice
  - compliance variable; comfort, longevity
  - efficacy difficult to measure

# Outcome measures

- CMOP
- PRWHE
- DASH
- ULFI
- UEFI

## THE UPPER EXTREMITY FUNCTIONAL INDEX (UEFI)

We are interested in knowing whether you are having any difficulty at all with the activities listed below because of your upper limb problem for which you are currently seeking attention. Please provide an answer for each activity.

Today, do you or would you have any difficulty at all with:

(Circle one number on each line)

	Activities	Extreme Difficulty or Unable to Perform Activity	Quite a Bit of Difficulty	Moderate Difficulty	A Little Bit of Difficulty	No Difficulty
1	Any of your usual work, housework, or school activities	0	1	2	3	4
2	Your usual hobbies, re creational or sporting activities	0	1	2	3	4
3	Lifting a bag of groceries to waist level	0	1	2	3	4
4	Lifting a bag of groceries above your head	0	1	2	3	4
5	Grooming your hair	0	1	2	3	4
6	Pushing up on your hands (eg from bathtub or chair)	0	1	2	3	4
7	Preparing food (eg peeling, cutting)	0	1	2	3	4
8	Driving	0	1	2	3	4
9	Vacuuming, sweeping or raking	0	1	2	3	4
10	Dressing	0	1	2	3	4
11	Doing up buttons	0	1	2	3	4
12	Using tools or appliances	0	1	2	3	4
13	Opening doors	0	1	2	3	4
14	Cleaning	0	1	2	3	4
15	Tying or lacing shoes	0	1	2	3	4
16	Sleeping	0	1	2	3	4
17	Laundrying clothes (eg washing, ironing, folding)	0	1	2	3	4
18	Opening a jar	0	1	2	3	4
19	Throwing a ball	0	1	2	3	4
20	Carrying a small suitcase with your affected limb	0	1	2	3	4
	<b>Column Totals:</b>					

Minimum Level of Detectable Change (90% Confidence): 9 points

SCORE: \_\_\_/80

Source: Stratford PW, Binkley, JM, Stratford DM (2001): Development and initial validation of the upper extremity functional index. Physiotherapy Canada. 53(4):259-267.

**Patient Specific Index (PSI):** Note 5 activities that are important to you and affected by your arm problem. If you cannot think of 5, choose from the ones you have marked above.

Score each activity on a scale range as follows, you may use Half (½) marks if you wish:

0 = BEST: Never affected / Can do activity normally 5 = WORST: Always affected / Can't do activity at all

	ACTIVITY	Score
1.		
2.		
3.		
4.		
5.		

PSI Total = \_\_\_\_\_

% Score = (Total x 4) = \_\_\_\_\_

MDC (90% Confidence): 10.5 % or 2.6 ULFI points. Change < this may be due to error

Think of yourself over the last few days and due to your arm - assess your Overall Status compared to your normal or pre-injury level?

0 1 2 3 4 5 6 7 8 9 10  
Pre-Injury or Normal Worst Possible

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### Radiocarpal joint

- synovitis of volar radioscaphocapitate ligament
- vertical rotation of scaphoid → wrist instability

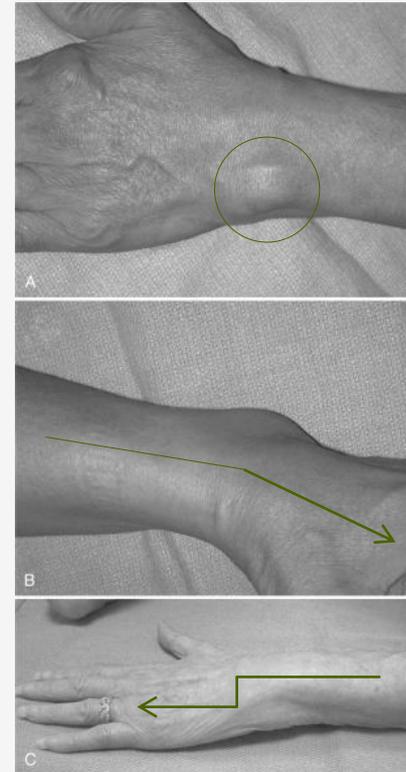
### Scapholunate joint

- synovitis of SL ligament
- rotatory instability of scaphoid
- scaphoid assumes volar-flexed position
- loss of carpal height
- Imbalance of extrinsic tendons

### DRUJ

- caput ulna syndrome
- ECU subluxes volarly, becomes a wrist flexor
- unopposed radial extensors deviate wrist radially
- ulnar carpus subluxes volarly and supinates
- prominence of ulna head

## The Wrist



synovitis causes instability of major ligaments due to abundance of synovium in region of ligaments

# Wrist splints & exercises

- 2008 RCT 33 RA patients with wrist arthritis (Veehof et al)
- Random allocation to splint or no splint
- prefabricated wrist working splint worn as much as possible during the day
- large and highly significant effect on wrist pain
- VAS pain scores decreased by 32% in splint group, increased by 17% in control group
- evidence now in favour of strengthening

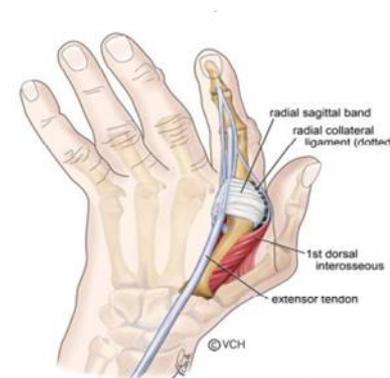
**Table 1. Strategies to increase patients' adherence to wearing the wrist working splint\***

<p>Splint prescription by an expert (OT) to optimize splint fitting and perceived comfort.</p> <p>Evaluation and discussion (if necessary) of outcome expectations of the patient concerning benefits and working of the splint.</p> <p>Evaluation of the daily activities of the patient and determination of activities during which the splint will be worn.</p> <p>Involvement of the patient in the selection of the splint.</p> <p>Discussion and removal (if possible) of potential barriers (e.g., performance of wet and dirty activities, long drying time, the straps sticking to clothing). At least the following solutions were offered:</p> <p>Prescription of 2 splints (for the same wrist).</p> <p>Plastic gloves.</p> <p>Adjustment of the straps (cutting them at the correct size and folding and sewing them at the end).</p> <p>Distribution of written instructions on the purpose and function of the splint, wearing instructions, potential barriers, and washing instructions.</p> <p>Explanation of the importance of adherence.</p> <p>Keeping a daily diary of splint use by the patient.</p> <p>Telephone evaluation of splint use after 1 week of prescription by the OT. If necessary, advice is given and/or measures are taken.</p>
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\* Strategies were derived from a former study on the determinants of splint use in patients with RA (16). OT – occupational therapist.

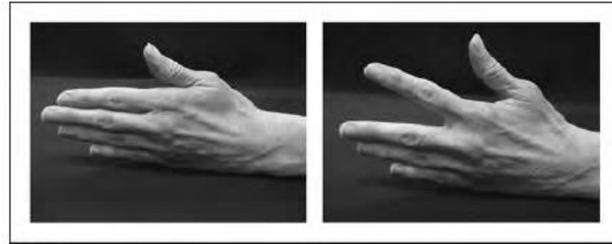
# MCPJs – Ulnar deviation deformity

- MCP synovitis
- Attenuation of RCL, UCL, VP
  - bowstringing of flexor tendons
  - **volar subluxation** at MCP
- Attenuation of sagittal bands
  - EDC subluxes ulnarly
  - **ulnar deviation** at MCP
- Other contributors
  - Wrist radial deviation
  - MC heads ulnar slope
  - Stronger flexors pull base of pp
  - Force of pinch against IF



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- Active/active assisted MCP extension
- Radial interossei low intensity isometric
- Radial finger walking
  - Initially gravity assist then against gravity
  - ? resisted
- Prevent intrinsic shortening
  - Active hook
  - Passive stretch
- TGEs (avoid table top)



**FIGURE 3.** Radial finger walking in gravity-added position. Start with forearm in neutral position. Patient actively moves each finger towards the thumb while keeping the metacarpophalangeal joints extended.

## UDD - exercises

- Prevent progression of ulnar drift and proximal phalanx subluxation

# UDD splinting

- Functional / resting
- MCP extension & radial deviation
- Control wrist



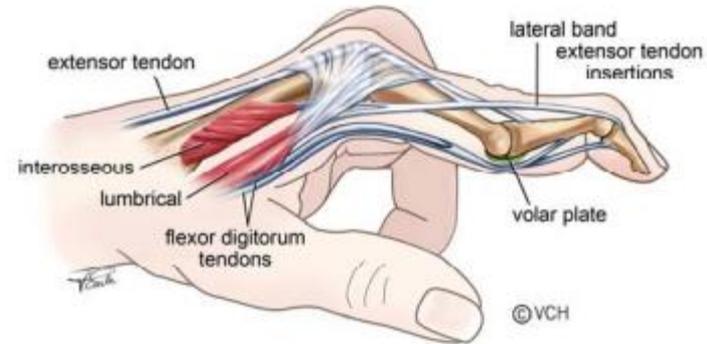
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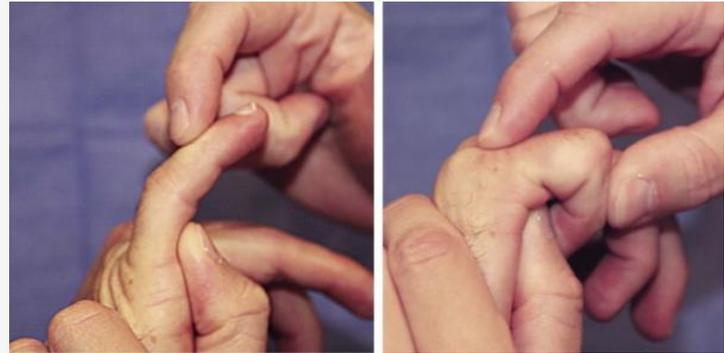
# IPJ deformities – swan neck

- PIP hyperextension, DIP flexion
- Usually initiated by synovitis at MCP
  - Intrinsic tightness
  - Greater pull on extensor mechanism extends PIP
  - Lateral bands sublux dorsally
  - Reciprocal flexion of DIP
  - Synovitis can cause mallet deformity
- Attenuation of VP at PIP causes PIP instability
- Early SND; can passively flex PIP
- Late SND: fixed deformity
  - Inability to flex fingers,
  - Profound loss of function



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- Intrinsic stretch
- Blocked PIP flexion
- Passive
  - MCP extension
  - PIP flexion
  - DIP extension
- TGEs
- Care with strengthening due to weakened structures
- Care with stretch during active synovitis

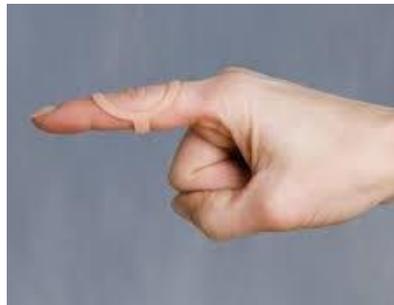


Test for intrinsic tightness

## Swan neck deformity - exercises

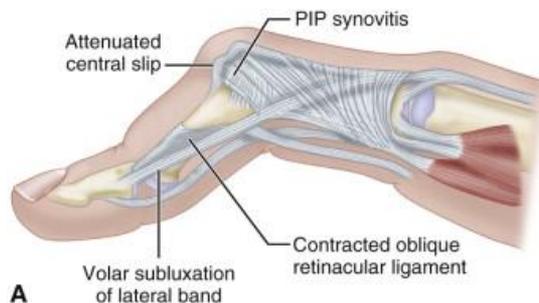
- Prevent intrinsic shortening
- Maintain PIP flexion

# SND - splinting

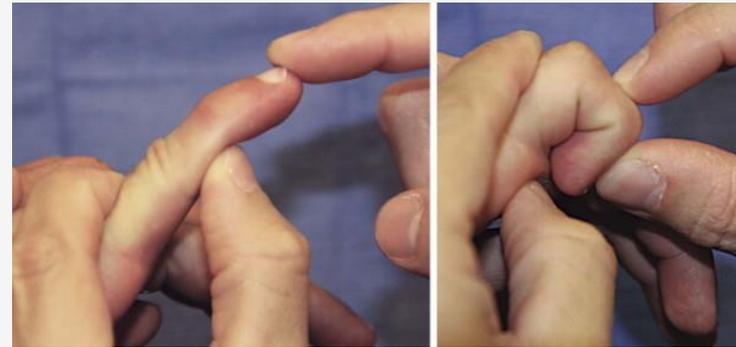


# IPJ deformities – boutonniere

- PIP flexion, DIP hyperextension
- Synovitis causes distension of PIPJ capsule and extensor apparatus
- Central slip attenuation → ineffective PIP extension
- Attenuation of triangular ligament → volar displacement of lateral bands
- Lateral bands become flexors of the PIP / extensors of DIP



- Blocked PIP extension
- Passive PIP extension
- Prevent shortening of volar plate
- ORL stretch
- ? strengthen central slip if intact



ORL test

## Boutonniere deformity - exercises

- Prevent PIP flexion contracture

# Boutonniere deformity – splinting

- Splint to prevent fixed flexion deformity
- Cylinder/gutter splints not very functional
- ? only at night
- Digi-sleeve or coban to reduce PIP oedema



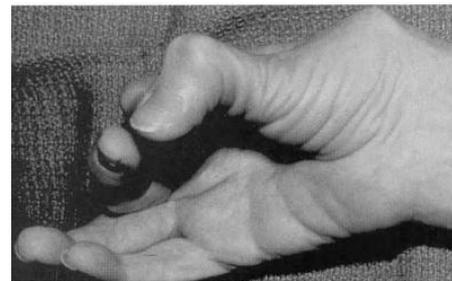
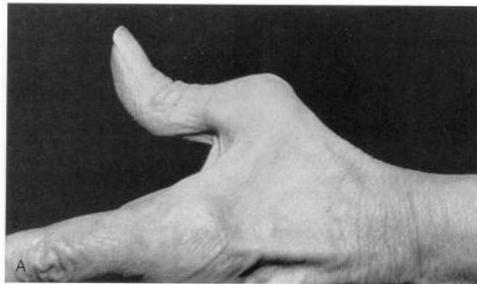
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# The Thumb

## RHEUMATOID THUMB CLASSIFICATION (eatonhand.com)

I	Boutonniere	IA	MP and IP passively correctable
		IB	MP flexion contracture , IP correctable
		IC	MP flexion and IP extension contractures
II	Combination I and III	IP hyperextension, MP flexion CMC subluxation or dislocation	
III	Swan	IIIA	Minimal CMC deformity, MP correctable
		IIIB	CMC subluxation, MP correctable
		IIIC	CMC dislocation, MP extension contracture
IV	Gamekeeper's	CMC adduction contracture MP abduction contracture	

**Type 1**  
Boutonniere  
(most common)



**Type III**  
Swan Neck (2<sup>nd</sup>  
most common)  
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# The Thumb

- Anti-deformity splinting
- Strengthening of CMC stabilizers
- Web space stretch



# Summary

- Rheumatoid arthritis can cause major deformities and loss of hand function
- Introduction of biologic drugs has resulted in development of fewer deformities
- Increasing evidence for conservative interventions
- How will hand therapy interventions change with better controlled disease
  - ?greater emphasis on strengthening
  - ?better chance at preventing soft tissue changes
  - Studies on patients with well controlled disease

# Rheumatoid Arthritis Joint Protection

- Website By Mayo Clinic

<http://www.mayoclinic.org/diseases-conditions/rheumatoid-arthritis/in-depth/arthritis/art-20047954>

Audience: Therapist and Patient

Cost: free website

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# Websites

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- <http://www.arthritis.ca/Provinces/BC/Resource-Guide/Healthcare-Professional/Assessment-Tools-Treatment?>
- <http://www.arthritis.ca/document.doc?id=557> Best Practice Recommendations
- [www.rheumatology.org](http://www.rheumatology.org)
- <http://emedicine.medscape.com/article/331037-overview>
- Images used with permission from <http://www.mdconsult.com/das/figure/body/420839891-10>